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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

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Comewango Creek Dam
Cattaraugus County
Allegheny River Basin

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report presents information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

Examination of available documents and visual inspection of the Conewango Creek Watershed Conewango Creek Dam (Site 16A) and appurtenant structures did not reveal conditions which constitute a hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

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Significant erosion was observed on the upstream slope of the embankment. In addition, springs were observed on the west slope of the west emergency spillway, and a ponded water condition was observed at the upstream end of the east emergency spillway. It is recommended that each of these conditions be further evaluated by a qualified registered professional engineer.

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the dam would not be overtopped under full PMF conditions. The PMF routed through the reservoir required only 62 percent of the spillway outflow capacity. The spillway is therefore judged to be adequate.

The recommended investigations should be completed within 12 months of notification to owner, and remedial actions resulting from these investigations completed in the subsequent 12 months.

The following remedial measures should be performed within 1 year of notification to owner:

- Develop a formal downstream warning system.
- Develop and maintain a program of periodic technical inspections.
- Implement a program of periodic maintenance including: mowing of slopes, backfilling animal burrows, tire ruts and eroded areas, clearing debris from trash racks and operating and lubricating the drain gate.
- Remove trees and saplings from slopes.

ALLEGHENY RIVER BASIN

CONEWANGO CREEK WATERSHED
CONEWANGO CREEK DAM (SITE 16A)

CATTARAUGUS COUNTY, NEW YORK
INVENTORY No. N.Y. 557

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NEW YORK DISTRICT, CORPS OF ENGINEERS

AUGUST 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the Investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event a finding that a spillway will not pass the Test Flood should not be interpreted as necessarily posing a highly inadequate condition. The Test Flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Conewango Creek Watershed Conewango Creek Dam (Site 16A)
State Located:	New York
County Located:	Cattaraugus
Stream:	Elm Creek
Basin:	Allegheny River
Date of Inspection:	April 3, 1981

ASSESSMENT

Examination of available documents and visual inspection of the Conewango Creek Watershed Conewango Creek Dam (Site 16A) and appurtenant structures did not reveal conditions which constitute a hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

Significant erosion was observed on the upstream slope of the embankment. In addition, springs were observed on the west slope of the west emergency spillway, and a ponded water condition was observed at the upstream end of the east emergency spillway. It is recommended that each of these conditions be further evaluated by a qualified registered professional engineer.

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the dam would not be overtopped under full PMF conditions. The PMF routed through the reservoir required only 62 percent of the spillway outflow capacity. The spillway is therefore judged to be adequate.

The recommended investigations should be completed within 12 months of notification to owner, and remedial actions resulting from these investigations completed in the subsequent 12 months.

The following remedial measures should be performed within 1 year of notification to owner:

- Develop a formal downstream warning system.
- Develop and maintain a program of periodic technical inspections.
- Implement a program of periodic maintenance including: mowing of slopes, backfilling animal burrows, tire ruts and eroded areas, clearing debris from trash racks and operating and lubricating the drain gate.
- Remove trees and saplings from slopes.

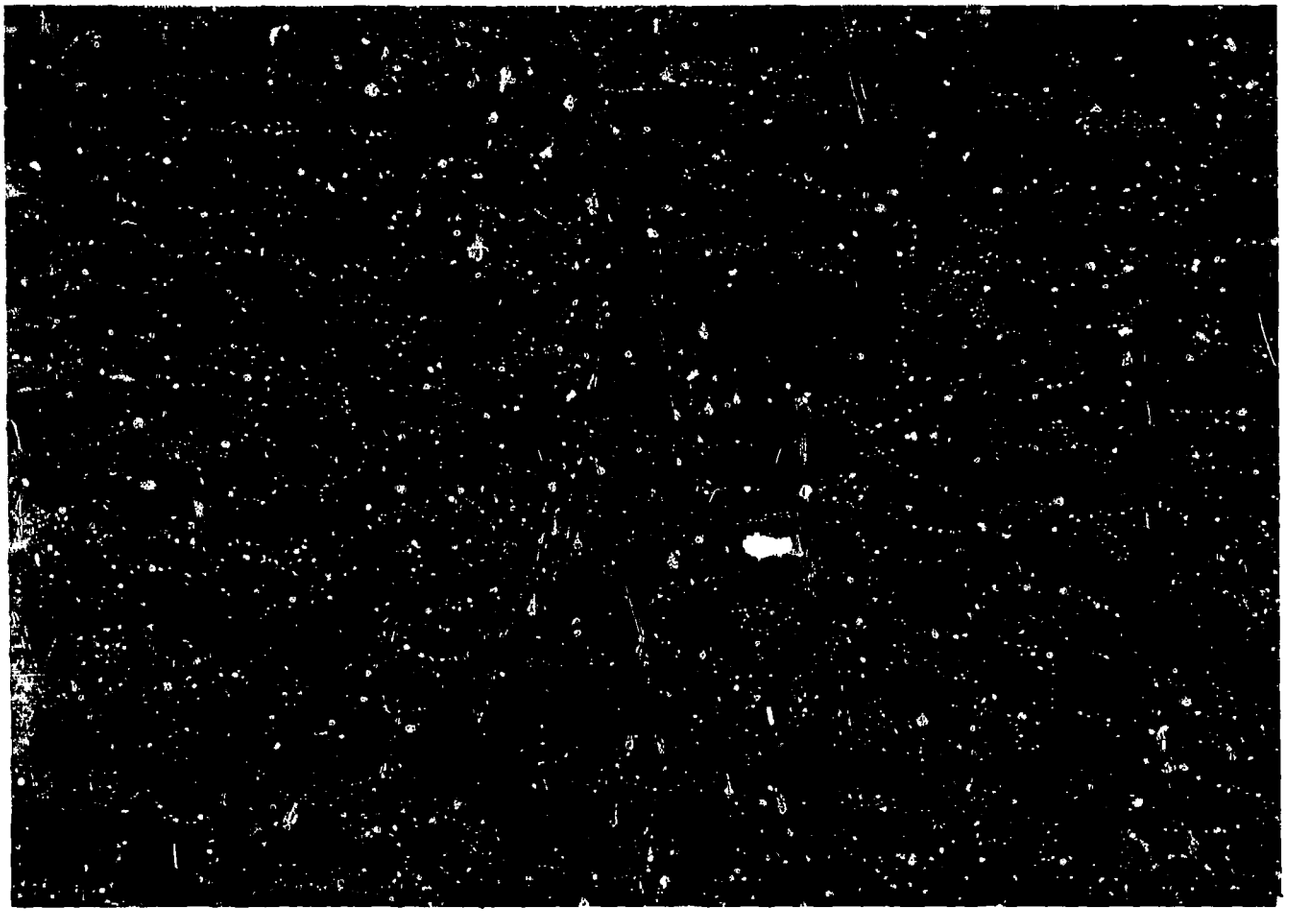
Robert J. Farrell, P.E.
New York No. 55983

Approved by:

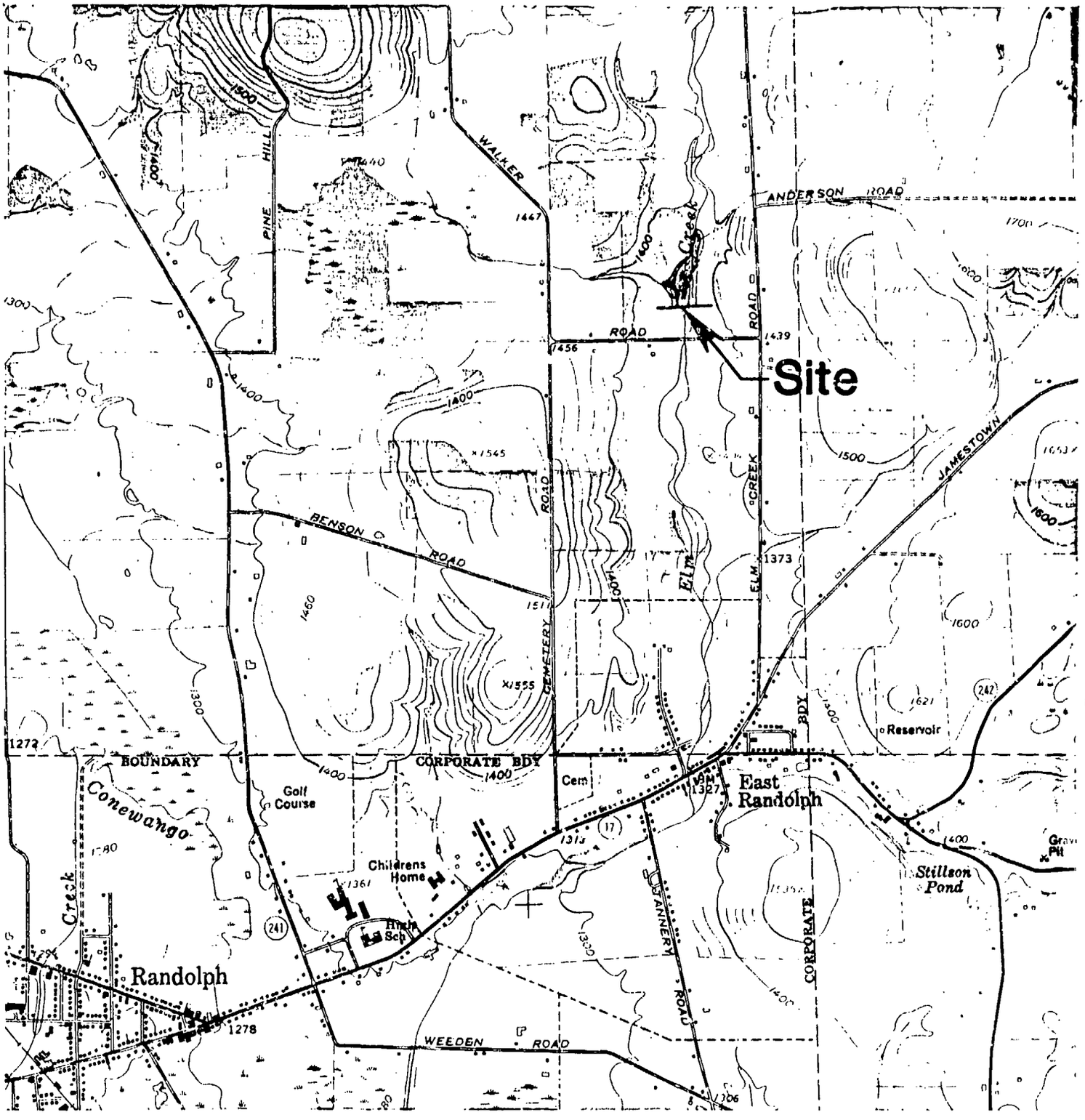
Col. W.M. Smith, Jr.
New York District Engineer

Date: 18 Aug 81

Conewango Creek Dam
(Site 16A)



AERIAL VIEW



Conewango Creek Dam
(Site 16A)

LOCATION PLAN

Scale: 1"=2000'

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

CONEWANGO CREEK WATERSHED

CONEWANGO CREEK DAM (SITE 16A)

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I inspection reported herein was authorized by the New York District Corps of Engineers in a letter dated 24 February 1981, in fulfillment of the requirements of the National Dam Inspection Act, Public Law 92-367, dated 8 August 1972.

b. Purpose of Inspection

This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF THE PROJECT

a. Location

The Conewango Creek Dam (Site 16A) is located on Elm Creek approximately 1.3 miles north of the Village of East Randolph along Elm Creek Road in the Town of Conewango, New York. The dam is shown on USGS Randolph, New York quadrangle with coordinates approximately at N42° 11.4', W78° 57.0' (see location plan). Page B-4 of Appendix B is a site plan for this dam.

b. Description of Dam and Appurtenances

The dam consists of a zoned earthfill embankment with an earthfill cutoff trench below; a principal spillway with a reinforced concrete riser structure and outlet pipe; and two vegetated earth channel emergency spillways located in the east and west abutments. The length of the dam embankment is approximately 1550 ft. The two emergency spillways total 400 ft. in weir length.

1. Dam Embankment

The embankment is made up of semi-pervious gravelly silt and oversize material up to 12 in. diameter. It is approximately 1580 ft. long and a maximum of 44 ft. high.

The upstream slope is 3 horizontal to 1 vertical and the downstream slope is 2.5 horizontal to 1 vertical. The crest width is 16 ft.

Beneath the embankment is an earthfill cutoff trench which is 14 ft. wide at the bottom. According to available plans, it is constructed of the same material as the embankment.

The dam is founded on gravelly silt and glacial till.

2. East Emergency Spillway

The east emergency spillway is cut into glacial till in the east abutment. There is a diversion berm on both sides of the channel. The grass covered channel right around east end of the dam embankment.

The control section is 268 ft. wide and 50 ft. long and is at elevation 1413.0. The channel downstream of the control section is approximately 500 ft long.

The side slopes are 3 horizontal to 1 vertical and are grass covered.

3. West Emergency Spillway

The west emergency spillway is cut into glacial till in the west abutment. A diversion berm of compacted fill has been constructed on the left side with side slopes of 3 horizonal to 1 vertical. The grass covered channel curves around the west end of the dam embankment.

The control section is 160 ft. wide and 50 ft. long and the downstream channel is roughly 450 ft. long.

The upstream west side of this spillway is equipped with a drain of 6 in. diameter clay tile surrounded by a graded filter. It is approximately 300 ft. long and daylights at the west upstream end of the emergency spillway channel.

4. Principal Spillway

The principal spillway is a drop inlet structure consisting of a single stage reinforced concrete riser with a sluice gate controlled inlet pipe, a 42 in. diameter concrete water pipe and a reinforced concrete impact basin.

The riser structure is 10 ft. high. Its inside dimensions are 10.5 ft. normal to the axis of the dam and 3.5 ft. parallel to the embankment. The walls of the structure are 12 in. thick. There are three 12.5 ft. long by 4 ft. high by 10 in. thick reinforced concrete walls spanning across the top of the riser which support galvanized steel grating and angle sections forming the trash rack.

At the base of the structure is a 24 in. diameter, vertical left sluice gate inlet which is controlled by a wheel operated stem extending to the top of the structure. A 24 in. cast iron pipe extends 22 ft., upstream from the lift gate into the impoundment. Plans indicate a reinforced concrete inlet structure at the upstream end of this pipe which is protected by a trash rack of galvanized steel angles placed on an incline across the opening.

The "high stage inlet" consists of the open top of the riser. It is protected by a trash rack assembly. This assembly is fabricated from galvanized steel angle sections connected to the concrete walls spanning across the top of the riser parallel to the embankment.

The riser structure is drained by a 42 in. diameter reinforced concrete pressure pipe. It is approximately 224 ft. long and drops approximately 5.3 ft. over that length. The pipe penetrates the downstream side of the riser structure and is supported by a 4 in. thick concrete cradle within the embankment. Plans indicate 7 reinforced concrete anti-seep collars cast around the pipe within the embankment.

The downstream end of the pipe penetrates the reinforced concrete impact basin. The inside dimensions of the impact basin are 20.5 ft. wide normal to the axis of the dam and 15.3 ft. long parallel to the embankment. It is 11 ft.high at the upstream face and tapers to 6.5 ft. at the downstream end. At the downstream side, there is a cutoff wall extending 4.5 ft. beneath the floor of the impact basin and there are two wingwalls 4.75 ft. beyond the walls of the basin parallel to the embankment. There is a 1 ft. thick by 6.5 ft. high baffle spanning between the walls of the impact basin.

5. Foundation and Embankment Drainage

A vertical seepage drain is located beneath the downstream slope to provide a safe outlet for seepage. It is 4 ft. wide and of variable depth. From approximately 100 ft. west of the east abutment to approximately 260 ft. east of the west abutment, the drain contains a system of two 8 in. diameter, perforated metal pipes which outlet on either side of the impact basin outlet structure. Two lateral drains of 8 in. pipe daylight on at toe of the downstream slope at 500 ft. west of the east abutment and 300 ft. east of the west abutment.

c. Size Classification

The dam's maximum impoundment of 1514 acre-feet places it in the INTERMEDIATE size category according to the Corps of Engineers Recommended Guidelines.

d. Hazard Classification

The hazard potential classification for this dam is HIGH because of the significant economic losses and high potential for loss of life downstream in the event of dam failure. Section 5 of this report presents more detailed discussion of the hazard potential.

e. Ownership

The dam is owned and operated by:

Conewango Creek Watershed Commission
Donald Crowell, Chairman
RD #2
S. Dayton, New York 14138
Tele: (716) 988-3300

f. Purpose of Dam

The purpose of this dam is to reduce downstream flooding by providing temporary storage for uncontrolled runoff from 3552 acres downstream of dam NY00593. The drainage area upstream of dam NY00593 is 5120 acres. The total drainage area is 8,672 acres. The temporary storage is released gradually through the single stage principal spillway system.

g. Design and Construction History

The dam was built under the Watershed Protection and Flood Prevention Act by the Conewango Creek Watershed Commission with the assistance of the Soil Conservation Service. It was completed in 1970.

h. Normal Operating Procedures

The dam is normally self-regulating

1.3 Pertinent Data

a) Drainage Area

The total drainage area for this dam covers 13.6 square miles. It is made up primarily of rolling pasture and woodland and minor development. Dam NY00593 is located 2.4 miles upstream.

b. Discharge at Dam Site

1) Outlet Works

Normal discharge at the site is through the 42 in. diameter outlet pipe. In the event of severe flooding, water would flow over the emergency spillways at elevation 1413.0 ft. (MSL). There is no low stage orifice for this dam. The invert of the high stage orifice is at elevation 1392.7 (MSL).

2) Maximum Known Flood

There is no data available for the maximum known flood at dam site. Evidence of recent high water was observed at elevation 1399.2 ft (MSL).

3) Ungated Spillway Capacity at Top of Dam

The capacity of the principal spillway with the reservoir at top of dam elevation (1421.6 ft. MSL) is 298 cfs. The capacity of the emergency spillway is 34,542 cfs at this level.

4) Ungated Spillway Capacity at Test Flood

The capacity of the principal spillway with the reservoir at test flood elevation (1419.4 ft. MSL) is 286 cfs. The capacity of the emergency spillway is 22,231 cfs at this level.

5) Gated Spillway Capacity at Normal Pool

There are no gated spillways

6) Gated Spillway Capacity at Test Flood

As previously mentioned, there are no gated spillways

7) Total Spillway Capacity at Test Flood

The total spillway capacity at test flood elevation 1419.4 MSL 22,517 cfs.

c. Elevation (ft. above NGVD)

1) Streambed at toe of dam: 1377.4
2) Bottom of cutoff: variable, approximately 1370 minimum
3) Maximum tailwater - unknown, outlet conduit invert 1377.4
4) Normal pool: 1392.7
5) Full flood control pool: 1413.0
6) Spillway crest - Low level orifice: N/A
   High level orifice: 1392.7
   Emergency spillways: 1413.0
7) Design surcharge (original design): 1413.0
8) Top of dam: 1421.6
9) Test flood surcharge: 1419.4

d. Reservoir (Length in feet)

1) Length of maximum pool: 3400± ft.
2) Length of normal pool: 980± ft.
3) Length of flood control pool: 2500± ft.

e. Storage (acre-feet)

1) Normal pool: 51.1
2) Flood control pool: 769.2 (excludes 120 acre-feet of 100 yr. sediment storage)
3) Spillway crest pool:
   a. Low stage inlet: N/A
   b. High stage inlet: 51.1
   c. Emergency spillway: 769.2 (excludes 120 acre-feet of 100 yr sediment storage)

f. Reservoir Surface (acres)

1) Normal pool: 14
2) Flood control pool: 71
3) Spillway crest pool:
   a. Low stage inlet: N/A
   b. High stage inlet: 14
   c. Emergency spillway: 71
4) Test flood: 94
5) Top of dam: 102

g. Dam

1) Type: Earth Embankment
2) Length: 1580 ft.
3) Height: 44 ft.
4) Top Width: 16 ft.
5) Side Slopes:

   Upstream: 3H:1V
   Downstream: 2.5H:1V

6) Zoning: Semi-pervious gravelly silt with oversize material to 12 in. diameter at the downstream toe, seepage drain under the downstream embankment

7) Impervious Core: None
8) Cutoff: 14 ft. width, earthfill
9) Grout Curtain: None

h. Diversion and Regulating Tunnel

Not applicable

i. Spillways

1) Type:

a. Principle Spillway - Reinforced concrete drop inlet

b. East Emergency Spillway - Grass covered earth channel cut into glacial till at east abutment

c. West Emergency Spillway - Grass covered earth channel cut into glacial till at west abutment

2) Length of Weir:

a. Pond drain: 24 in. diameter pipe
b. Principal spillway orifice: 20 ft. perimeter
c. East emergency spillway: 268 ft.
d. West emergency spillway: 160 ft.

3) Crest Elevation: (feet above NGVD)

a. Pond drain invert: 1384.5
b. Principal spillway: 1392.7
c. East emergency spillway: 1413.0
d. West emergency spillway: 1413.0

4) Gates: None

5) Upstream Channel: Elm Creek, narrow stream to reservoir through farm and woodland.

Downstream Channel: Elm Creek, narrow stream through farm and woodland.

j. Regulating Outlet: None

SECTION 2 - ENGINEERING DATA

2.1 GEOLOGY

Bedrock at the dam site is Late Devonian Age (345-375 million years ago) shales and siltstones of the Canadaway Group. These relatively underformed flat-lying sedimentary rocks are generally medium hard. Regionally the bedrock forms a homocline dipping southward to southwestward at approximately 40 feet per mile. Small terraces and low folds locally modify this dip to essentially flat-lying over short distances. Only minor folding and faulting are found in the region with no major or active faults known to exist in the area.

The Conewango Creek Dam (Site 16A) is in a region classified as Zone 2 seismicity, as shown on Figure No. 1 of the Recommended Guidelines for Safety Inpsection of Dams.

Pleistocene glaciation (beginning approximately 2 million years ago) has modified topography by means of erosion and deposition. The thick continental ice sheet advanced southward from Quebec and Ontario smoothing terrain with glacial scour and mantling uplands with till deposits. The Pleistocene geology of the dam site consists of ice-contact stratified drift deposits. Generally coarse gravel and sand deposits with random lenses of unsorted flow tills were deposited as the ice melted. In recent times alluvium has been deposited on the glacial material via upland erosion.

2.2 SUBSURFACE INVESTIGATION

Test hole logs are contained in the "As-Built" drawings. A total of 28 test pits and 20 drill holes were dug to determine subsurface conditions. The logs show that the dam is founded on glacial till.

2.3 DESIGN RECORDS

The records available for the project consists of 24 contract drawings which show the plans, sections and details of the dam, appurtenant structures, impact basin details and grating, fencing details, and logs of test holes; and a design report issued by the U.S. Soil Conservation Service dated March, 1970.

2.4 CONSTRUCTION RECORDS

Construction records and specifications are available at the U.S. Soil Conservation Service, Design Section, Syracuse, N.Y.

2.5 OPERATION RECORDS

No written maintenance or operation records exist for the dam.

2.6 EVALUATION OF DATA

Information obtained from the "As-Built" drawings is consistent with observations made during this inspection. The information obtained from available data was considered adequate for the Phase I inspection and evaluation.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

a. General

The Conewango Creek Dam is in GOOD condition at the present time.

b. Dam

1) Earth Embankment (See Photos 3 and 5)

The grass and brush growth is heavy on this embankment impeding inspection of the slopes. Shrubs were noted along the upstream embankment at the waterline and 5 small trees are growing near the west abutment. Debris has collected on the upstream slope.

Small (1") eddy current type erosion gullies were noted along the upstream slope.

The crest of the dam is rutted up to 2 to 4 inches deep by vehicular traffic.

There is no slope protection on the upstream slope other than the vegetative cover. Approximately 2 to 4 inches of erosion due to wave action was noted at the water line on the upstream slope.

The seepage drains under the downstream slope appear to be functioning properly as no seepage was noted at the dam. The outlet pipe for the east lateral drain was partially submerged at the time of the inspection and the discharge was estimated at approximately 20 gallons per minute. No staining was observed at the outlet pipe. The west lateral drain showed no flow. The drain outlets at the impact basin were completely submerged and could not be inspected.

2) East Emergency Spillway

This spillway is in good condition. There is a boggy area at the upstream end which is the result of natural groundwater from the adjacent slope. There was a minor amount of debris on the west end of the spillway.

3) West Emergency Spillway (See Photo 4)

This spillway is in good condition with the exception of three springs emanating from the west slope approximately 50 to 200 ft. downstream of the control section of the spillway channel. Some wet areas were noted in the channel which are the result of these springs. There was no debris accumulation on the spillway.

c. Appurtenant Structures

1) Drop Inlet Service Spillway (See Photos 1 and 3)

The structure is in good condition with no evidence of spalling, cracking, or efflorescence. The trash rack, although in good condition, was covered with debris. One large log had worked its way through the trash rack and was spanned across the riser crests. The gate for the reservoir drain was accessible from the top of the riser, but there was no handle with which it could be operated. The operating condition of the gate could not be determined.

2) Impact Basin (See photo 2)

The structure is in good condition. There was no evidence of spalling, cracking, or efflorescence. There was no evidence of erosion at the abutment of the structure.

d. Reservoir Area (See Photo 3)

The shore of the reservoir is generally shallow sloping pasture or woodland. It appears to be stable and in good condition.

e. Downstream Channel (See Photo 6)

The downstream channel is a narrow channel passing over relatively flat flood plain. There is rip rap protection of the plunge pool, but erosion of the banks has taken place above the level of the rip rap.

3.2 Evaluation

The dam is generally in good condition. The potential problems noted during the visual inspection are listed below.

a. The boggy area at the upstream end of the East Emergency Spillway.
b. The springs emanating from the west slope of the West Emergency Spillway.
c. Erosion of the upstream slope of the dam at the water line.
d. Tire ruts on the crest of the main dam.
e. Debris on upstream slope and in the trash rack of the intake structure.
f. Trees and brush growing on the upstream slope of the dam embankment.
g. The inoperability of the drain gate.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

No written operation and maintenance procedures exist for the project. The normal operation of the project consists of allowing water to flow through the service spillway outlet pipe.

4.2 MAINTENANCE OF DAM

Maintenance of the dam is performed when the need arises. Maintenance is not considered adequate as evidenced by trash racks, trees and brush, depressions, etc.

4.3 WARNING SYSTEM IN EFFECT

No warning system is in effect or in preparation.

4.4 EVALUATION

The overall condition of the dam and appurtenant structures appears to be good. Recommendations in connection with regular maintenance are discussed in Section 7.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 Drainage Area Characteristics

Conewango Creek Watershed Dam (Site 16A) is located on Elm Creek, a tributary of Conewango Creek in the Allegheny River basin, and has a drainage area of 13.6 square miles. The dam is situated approximately 1.3 miles north of the Village of East Randolph New York. The topography of the watershed is gentle rolling hills.

5.2 Design Data

This dam was designed as a Class C structure in accordance with criteria established in Washington Engineering Memorandum SCS-27. Under this classification, the emergency spillway is designed for a rainfall equal to P(100) + 0.26 [PMP-P(100)] while the freeboard pool is designed for the PMP rainfall.

The Soil Conservation Service (SCS) design calculations have been reviewed. The dam was designed to contain the runoff for the 100-year flood without discharging through the emergency spillways. For this condition, the peak outflow is 249 cfs and the peak elevation is 1413.0 ft. (MSL). The SCS design allowed for a 50-year sediment accumulation with a storage of 51 acre-ft. The principal spillway consists of a 42 in. diameter reinforced concrete water pipe and a 3.5 ft. x 10.5 ft. reinforced concrete riser with trash rack. The east and west emergency spillway control cross sections are 268 ft. and 160 ft. wide, respectively, with side slopes of 3 horizontal to 1 vertical and a crest elevation of 1413.0 ft. (MSL). The dam crest elevation is 1421.6 ft. (MSL).

5.3 Analysis Criteria

The analysis of the spillway capacity of the dam and the storage of the reservoir was performed using the Corps of Engineers HEC-1 Dam Safety Version computer model. The unit hydrograph was defined by the Snyder Synthetic Unit Hydrograph method, and the Modified Puls routing procedure was incorporated. The Probable Maximum Precipitation (PMP) was 22.7 in, (24 hours 200 sq. miles) from Hydrometerological Report #33 in accordance with the Recommended Guidelines of the Corps of Engineers. The dam is 44 ft. high and impounds approximately 1514 acre ft. at the top of the dam. The dam is classified as a HIGH hazard and INTERMEDIATE in size, according to the Recommended Guidelines of the Corps of Engineers. The spillway design flood is the Probable Maximum Flood (PMF). The floods selected for analysis were 20, 40, 50, 60, 80, and 100% of the PMF flows. The PMF inflow of 21,629 cfs was routed through the reservoir and the peak outflow was determined to be 21,519 cfs. The peak PMF outflow would produce an eroding velocity of 10.6 ft/sec on the emergency spillway.

5.4 Reservoir Capacity

The reservoir capacities at the crest of the emergency spillway and at the top of the dam are 769 acre-ft. and 1514 acre-ft, respectively. Surcharge storage between the emergency spillway crest and the top of dam is equivalent to 1.0 in. of runoff from the drainage area.

5.5 Experience Data

There are no flood records for the dam site, however, during the field investigation, evidence of recent high water was observed at elevation 1399.2 ft. (MSL). This reservoir elevation corresponds to a peak outflow of 140 cfs.

5.6 Overtopping Potential

The maximum capacity of the spillways is 34,840 cfs which is greater than the PMF peak outflow of 21,519 cfs. The dam is not overtopped by the PMF, the peak elevation being 2.4 ft. below the top of the dam.

5.7 Analysis of Downstream Impacts

During the field investigation, dwellings and highways located downstream of the dam were identified and referenced to the channel invert. The cross section locations used in the downstream channel routing are shown on Page D2, Appendix D. The impacts of the PMF on dwellings located downstream of the dam are shown in Table 5.1. For the purposes of this analysis, a danger of loss of life was assumed to exist if the computed PMF water surface was above the first floor elevation of a structure. This situation occurrs at 47 homes, and several other structures in the Village of East Randolph. (Locations 3, 4 and 5); and at 1 home immediately downstream of the dam (Location 1). The road crossings at locations 1, 4, and 5 are all overtopped during the PMF.

5.8 Evaluation

The spillway of ConewangoCreek Dam (Site 16A) will safely pass the PMF without overtopping. The spillway is therefore assessed as "Adequate". Potential problems include:

a) Erosion of the emergency spillway for the test flood conditions. Because of the low probability of occurrence of the PMF, and because there is no cost effective means of preventing the erosion, no preventative recommendations are deemed necessary.

b) The danger of loss of life and economic damage downstream of the dam for the test flood conditions.

TABLE 5.1

SUMMARY OF DOWNSTREAM IMPACTS FOR PMF

Location # (see page D-2 Appendix D)	Location	# of Dwellings	Structure Height above Streambed* (ft)	Peak Flow (cfs)	Peak Stage (ft)	Comments
-	At Dam	-	0	22,517	-	-
1	Walker Road Crossing	1 home, barn, sheds, garage	11	22,501	12	Road over-topped
2	2800' d/s of Location 1	None	-	22,510	11	-
3	1600' d/s of Location 2	20 homes, 1 church, 1 auto garage	11	22,511	u/s end 12 22 d/s end	Danger of of life. Significant economic damage
4	Old Rt. NY17 Crossing in E. Randolph	Firehouse Village Hall Beauty Shop Bar & Grill Post Office Farm Service Store 3 abandoned structures 12+ homes 1 church	9	22,435	22	Danger of loss of life. Extensive economic damages Road over-topped.
5	Tanney Road Crossing	19 homes	8	22,442	10	Danger of loss of life. Significant economic damage Road overtopped
6	1800' d/s of Loc. 5	10 homes	15	22,418	6	-

*The structure height above the streambed is the elevation of the first floor above the channel invert.

SECTION 6 - STRUCTURAL STABILITY

6.1 Visual Observations

There does not appear to be significant displacement or distress associated with the embankments at this site. The dam appears to be in good condition at the present time.

6.2 Design and Construction Data

Analyses carried out by the Soil Conservation Service during the design and construction phase included a slope stability analysis by the Swedish circle method. Trial arcs including 17 ft. of foundation material were considered in addition to those in the embankment itself. Using soil parameters of $\phi = 30^{\circ}$ and c = 0 the minimum calculated factors of safety were 1.39 for the upstream slope (3H:1V) and 1.45 for the downstream slope (2.5H:1V). Considering a 10 ft. berm on the downstream slope raised the calculated factor of safety to 1.57. The report on these analyses indicated that if the soil parameters were $\phi = 27^{\circ}$ and c = 0 the factors of safety dropped to 1.3 upstream and 1.4 downstream (with berm). For this reason, the report indicated a need for reviewing the density and shear strength of the silty stratum in the foundation. This report is dated 1/30/69. A supplemental report dated January 13, 1970 indicated that a sample of foundation material had been recovered and tested but that it was not a sample of the silty stratum in question. According to the record no further investigation was made to verify the assumptions made in the analysis.

6.3 Post Construction Changes

There have been no known changes to any of the embankments or structures at this dam.

6.4 Seismic Stability

The dam is located in Seismic Zone No. 2 and, in accordance with the recommended Phase I guidelines, a seismic stability analysis is not warranted.

SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

Examination of the available documents and visual inspections of the Conewango Creek Watershed Conewango Creek Dam (Site 16A) and appurtenant structures did not reveal any conditions which constitute a hazard to human life or property. The dam and its appurtenances are considered to be in good condition at the present time.

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the dam would not be overtopped for the spillway design flood of the full PMF. The principal and auxiliary spillway capacities are, therefore, judged as adequate.

b. Adequacy of Information

This report and its conclusions are based on visual inspection, interview data, contract drawings, and office hydrologic/hydraulic studies. This information and data are adequate for a Phase I inspection.

c. Need of Additional Investigations

It is recommended that the services of a qualified registered professional engineer be retained to evaluate:

a. The erosion of the upstream slope and make recommendations for the placement of erosion protection such as rip rap.

b. The springs in the west slope of the west emergency spillway to determine if remedial measures are necessary.

c. The ponded water condition at the upstream end of the east emergency spillway.

d. Urgency

All recommended investigations should be completed within 12 months of notification to owner, and remedial actions resulting from these investigations completed in the subsequent 12 months. The remedial measures or actions listed below should be completed within one year from notification to owner.

7.2. RECOMMENDED MEASURES

It is recommended that the owner institute the following remedial measures:

a. Develop a formal written downstream warning system to alert the appropriate officials and residents in the event of an emergency.

b. Develop and maintain a program of biannual technical inspections.

c. Implement a program of diligent and periodic maintenance including but not limited to: mowing of slopes and spillway channels; backfilling ruts, drainage gullies, and animal burrows with suitable compacted material; and clearing debris from trash racks and upstream slopes; and checking the operability of the drain gate.

d. Remove trees and saplings from slopes including the roots. The resulting voids should be backfilled with suitable compacted material and reseeded.

APPENDIX A

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Conewango Creek Dam

Fed. I.D. # NY00557 DEC Dam No. 25C-2977

River Basin Allegheny

Location: Town East Randolph County Cattaraugus

Stream Name Elm Creek

Tributary of Conewango Creek

Latitude (N) 42° 11.4' Longitude (W) 78° 57.0'

Type of Dam Earth Embankment

Hazard Category High

Date(s) of Inspection April 3, 1981

Weather Conditions Sunny, 60°

Reservoir Level at Time of Inspection Approximately elevation 1393 ft.

b. Inspection Personnel Mr. Chuck Conderman, Mr. Bob Farrell, Mr. Ken Avery Mr. James Reynolds, and Mr Jeff Hardin

c. Persons Contacted (including Address & Phone No.)

U.S. Soil Conservation Service, Rm 771-Federal Bldg, So. Clinton St., Syracuse, NY

State Construction Engineer: Philip "Skip" Nelson 1-315-423-5502

Area 1 Project Engr (Batavia): Pete Wright 1-716-343-3664

d. History:

Date Constructed 1972 Date(s) Reconstructed

Designer U.S.D.A. Soil Conservation Service

Constructed by

Owner

2) Embankment

a. Characteristics

(1) Embankment Material Gravelly silt

(2) Cutoff Type 14 ft. wide trench, earthfill, gravelly silt

(3) Impervious Core None

(4) Internal Drainage System 4 ft. trench drain with two 8 in. diameter perforate d metal pipes, 2 lateral drains

(5) Miscellaneous Side slopes 2.5H:1 V downstream and 3H:1V upstream

b. Crest

(1) Vertical Alignment Good

(2) Horizontal Alignment Good

(3) Surface Cracks None noted

(4) Miscellaneous Some rutting 2-4 in. deep

c. Upstream Slope

(1) Slope (Estimate) (V:H) 1 vertical to 3 horizontal

(2) Undesirable Growth or Debris, Animal Burrows 5 trees, 3-6 in. diameter at waterline near left abutment, brush growth along waterline

(3) Sloughing, Subsidence or Depressions None noted

(4) Slope Protection None, 2-4 inches of wave erosion

(5) Surface Cracks or Movement at Toe None noted

d. Downstream Slope

(1) Slope (Estimate - V:H) 1 vertical to 2.5 horizontal

(2) Undesirable Growth or Debris, Animal Burrows Heavy grass growth

(3) Sloughing, Subsidence, or Depressions None noted

(4) Surface Cracks or Movement at Toe None noted

(5) Seepage None noted

(6) External Drainage System (Ditches, Trenches, Blanket) Stone lined ditch from outlet of right lateral drain to outlet channel - no flow/ditch from outlet of left lateral drain - 20 GPM

(7) Condition Around Outlet Structure Good

(8) Seepage Beyond Toe Wet area downstream left of outlet may be seepage - should be investigated

e. Abutments - Embankment Contact

Cobble drain along left upstream contact, no flow, good condition

(1) Erosion at Contact None noted

(2) Seepage Along Contact None noted

3) Drainage System

(a) Description of System Two 8 in. diameter perforated pipes in a 4 ft. trench drain. Two lateral drains in additional to two outlets at impact basin

(b) Condition of System Appears good at the present time. Left lateral drain has 20 GPM flow but no staining, right lateral drain shows no flow. Impact basin outlets submerged and could not be inspected

(c) Discharge from Drainage System Above

4) Instrumentation (Momumentation/Surveys, Observation Wells, Weirs, Piczometers, etc.) None

5) Reservoir

a. Slopes Appear stable and in good condition

b. Sedimentation Very minor accumulation

c. Unusual Conditions Which Affect Dam None noted

6) Area Downstream of Dam

a. Downstream Hazard (No. of homes, highways, etc) Refer to Table 5.1 for a summary of downstream homes and highways

b. Seepage, unusual growth Downstream left area very wet and should be investigated

c. Evidence of movement beyond toe of Dam None noted

d. Conditions of Downstream Channel Good

7) Spillway(s) (including Discharge Conveyance Channel)

Principal spillway: Drop inlet structure with outlet conduit to impact basin. Vegetated earth emergency spillways: 160 ft. wide at the west abutment, and 260 ft. wide at the east abutment.

a. General Emergency spillways generally good condition

b. Condition of Service Spillway Good structural condition, however, trash rack is covered with debris.

c. Condition of Auxiliary Spillway Generally good, some ponding, ~~cont~~ not considered significant

d. Condition of Discharge Conveyance Channel Some erosion has taken place above the level of rip rap

8) Reservoir Drain/Outlet

Type: Pipe X Conduit _____ Other _____

Material: Concrete _____ Metal _____ Other Cast Iron

Size: 24" ID Length 22' (from dwgs)

Invert Elevations: Entrance _____ Exit _____

Physical Condition (Describe): Unobservable X

Material: _____

Joints: _____ Alignment _____

Structural Integrity: _____

Hydraulic Capability: _____

Means of Control: Gate _____ Valve X Uncontrolled _____

Operation: Operable _____ Inoperable X Other _____

Present Condition (Describe): Handle missing; could not be operated during inspection.

9) Structural

a. Concrete Surfaces N/A

b. Structural Cracking N/A

c. Movement - Horizontal & Vertical Alignment (Settlement) N/a

d. Junctions with Abutments or Embankments N/A

e. Drains - Foundation, Joint, Face N/A

f. Water Passages, Conduits, Sluices N/A

g. Seepage or Leakage N/A

h. Joints - Construction, etc. N/A

i. Foundation N/A

j. Abutments N/A

k. Control Gates N/A

l. Approach & Outlet Channels N/A

m. Energy Dissipators (Plunge Pool,etc) N/A

n. Intake Structures NA

o. Stability N/A

p. Miscellaneous N/A

10) Appurtenant Structures (Power House, Lock, Gatchouse, Other)

a. Description and Condition None

APPENDIX B

ENGINEERING DATA

APPENDIX B

CONEWANGO CREEK WATERSHED PROJE

FLOODWATER RETARDING DAM

SITE 16 A

DRAINAGE AREA	3552 Acres
FLOOD STORAGE (TO EMERGENCY SPILLWAY CREST)	769 Ac. Ft.
WATER SURFACE AREA (SEDIMENT POOL)	14 Acres
HEIGHT OF DAM	42 Feet
VOLUME OF FILL	~~234,000~~ 234,279 Cu.Yds.

BUILT UNDER THE WATERSHED PROTECTION AND FLOOD PREVENTION ACT

BY

CONEWANGO CREEK WATERSHED COMMISSION

WITH THE ASSISTANCE OF THE

SOIL CONSERVATION SERVICE

OF THE

U. S. DEPARTMENT OF AGRICULTURE

INDEX

/

SHED PROJECT

DAM

3552 Acres

769 Ac.Ft.

14 Acres

42 Feet

~~211,000~~ Cu.Yds.
234,279

TECTION AND
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ICE

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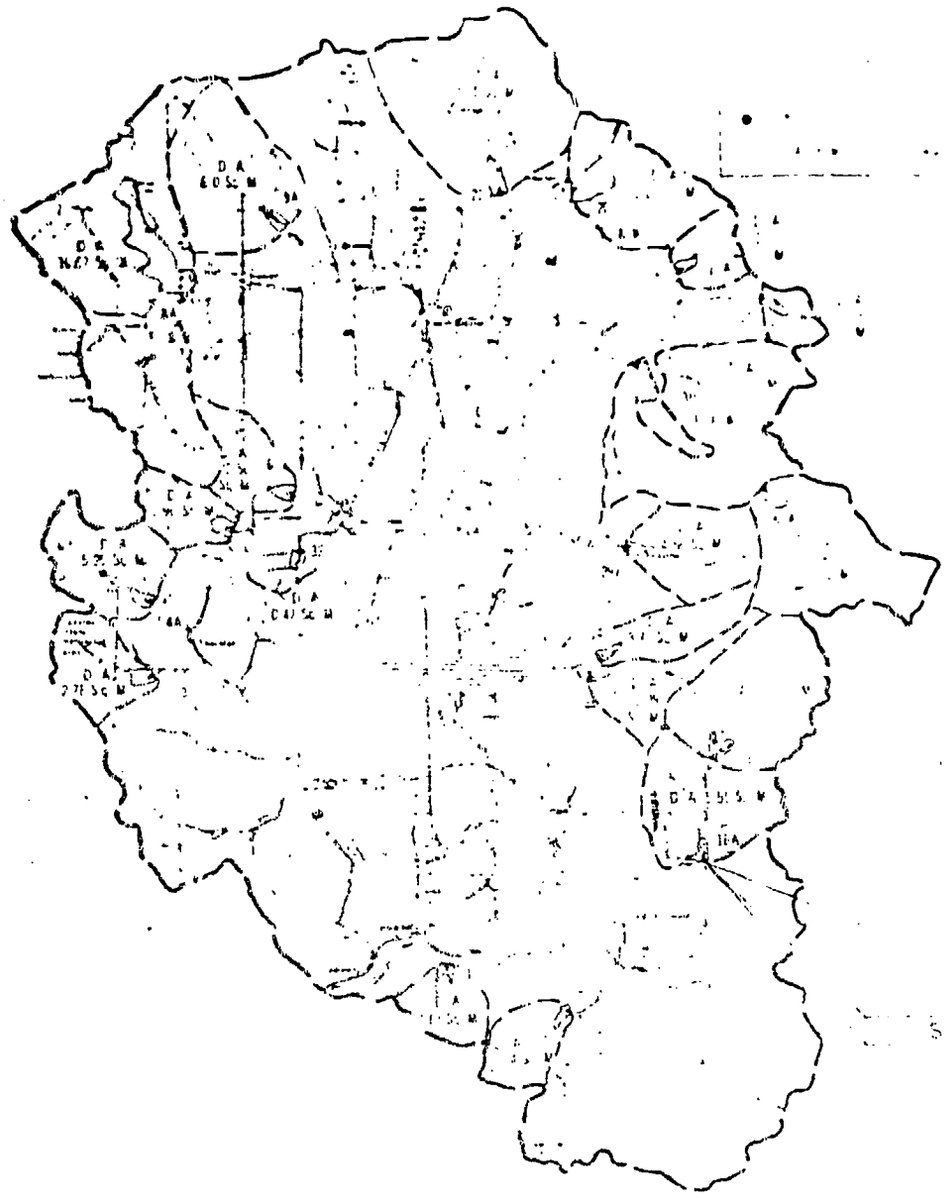


SITE 16A

RISER STRUCTURAL DETAILS
RISER STRUCTURAL DETAILS
RISER STRUCTURAL DETAILS
RISER TRASH RACK
CONDUIT DETAILS
IMPACT BASIN DETAILS
RESERVOIR DRAIN INLET DETAILS
FENCING DETAILS
LOGS OF TEST HOLES
LOGS OF TEST HOLES
LOGS OF TEST HOLES
VEGETATIVE TREATMENT

AC

10/20/72

DATE	FEB 1971	SHEETS 3,4,5	
		REVISIONS	

CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLOOD WATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
COVER SHEET
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

B-2

1

2

CONSTRUCTION DETAILS

1. Areas under the dam and levees (including 15 feet outside the toes), emergency spillways (including 15 feet outside the exit slopes), and borrow areas to be cleared and grubbed. Limits of area to be cleared and grubbed to be staked in the field by the engineer.

2. The waste areas and the area upstream from the dam and below elevation 1391.0 on both abutments and below elevation 1392.7 in the flood plain shall be cleared. Limits of area to be cleared shall be staked in the field by the engineer.

3. Depths and limits of borrow excavation shall be determined in the field by the engineer at the time of construction. At the completion of earth fill operations, the borrow areas will be left gently sloping, generally smooth, and free draining.

4. Bottom section of east emergency spillway to be covered with 6" of topsoil from sta. 4+50 to approx. sta. 11+00. Bottom section of west emergency spillway to be covered with 6" of topsoil from approx. sta. 4+50 to approx. sta. 9+80.

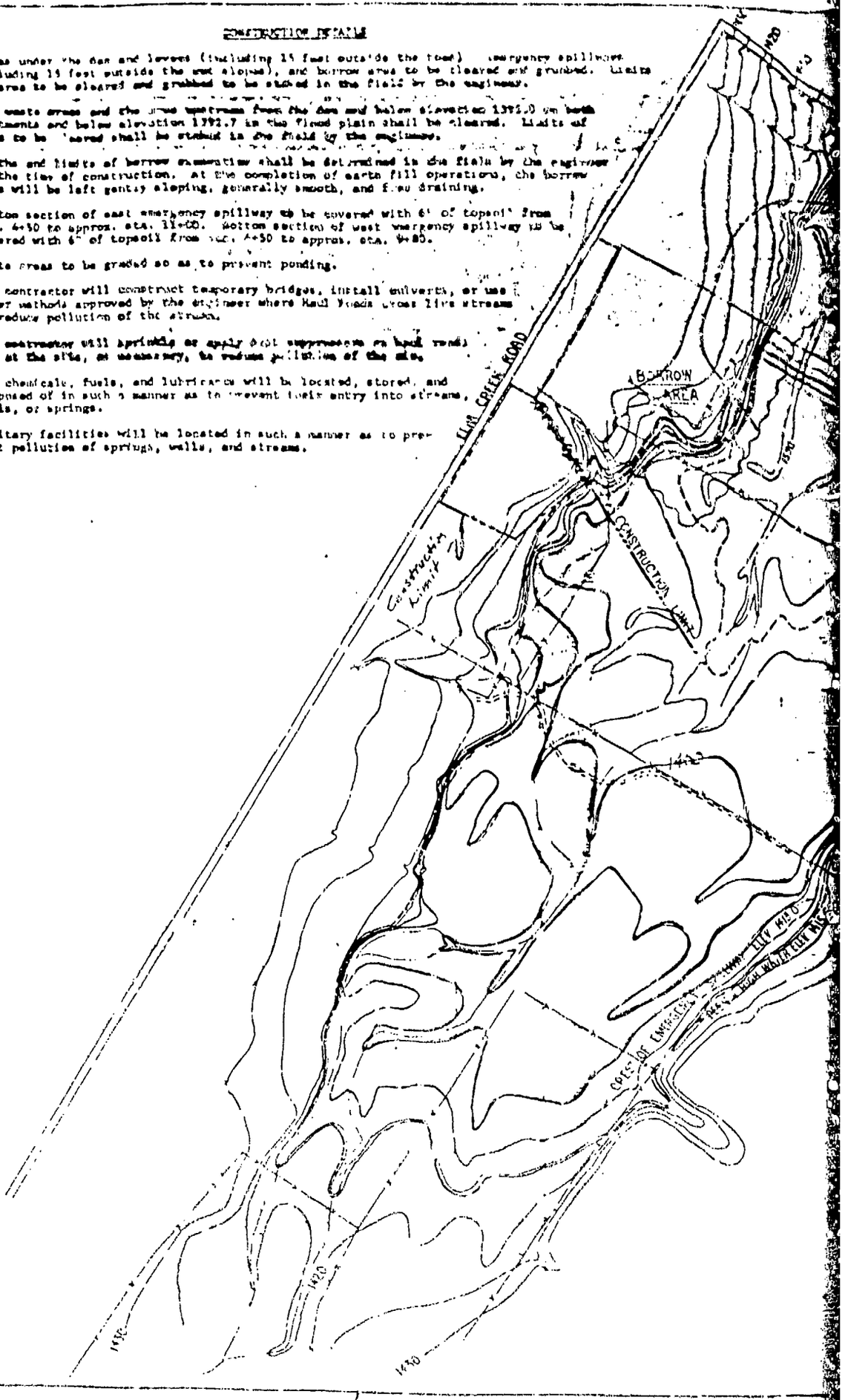
5. Waste areas to be graded so as to prevent ponding.

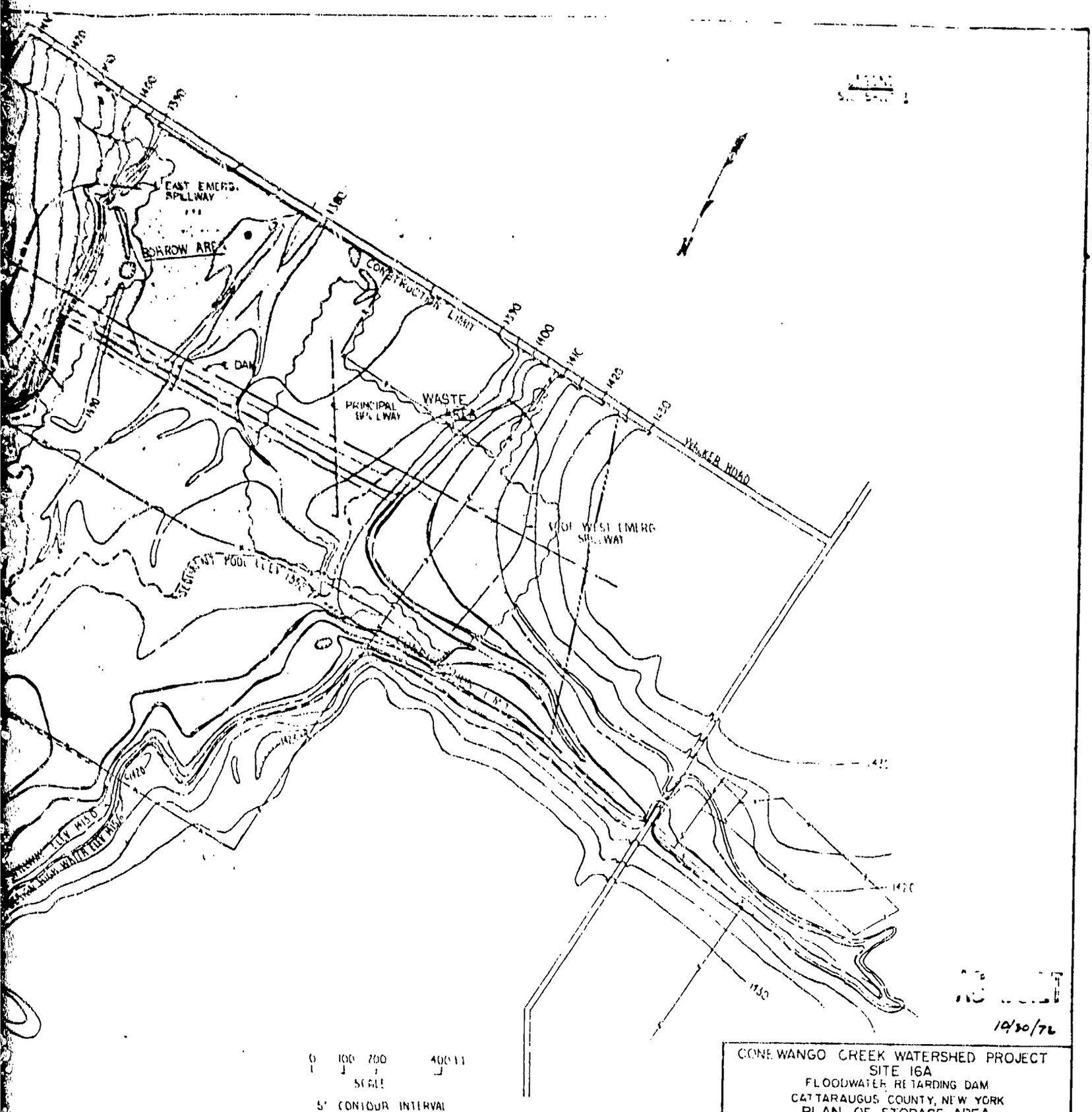
6. The contractor will construct temporary bridges, install culverts, or use other methods approved by the engineer where haul roads cross live streams to reduce pollution of the stream.

7. The contractor will sprinkle or apply dust suppressants on haul roads and at the site, as necessary, to reduce pollution of the air.

8. All chemicals, fuels, and lubricants will be located, stored, and disposed of in such a manner as to prevent their entry into streams, wells, or springs.

9. Sanitary facilities will be located in such a manner as to prevent pollution of springs, wells, and streams.





10/30/72

CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
PLAN OF STORAGE AREA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed W. RIEGEL	3/68	Approved by	
Drawn D. R. CASE	4/63	Title	
Traced W. F. GRAJKO JR.	3/68	Date	
Checked MN	3/70	Sheet No. 2 of 23 sheets	Drawing No. NY-2168-P

B-3

LAYOUT DATA CURVE I

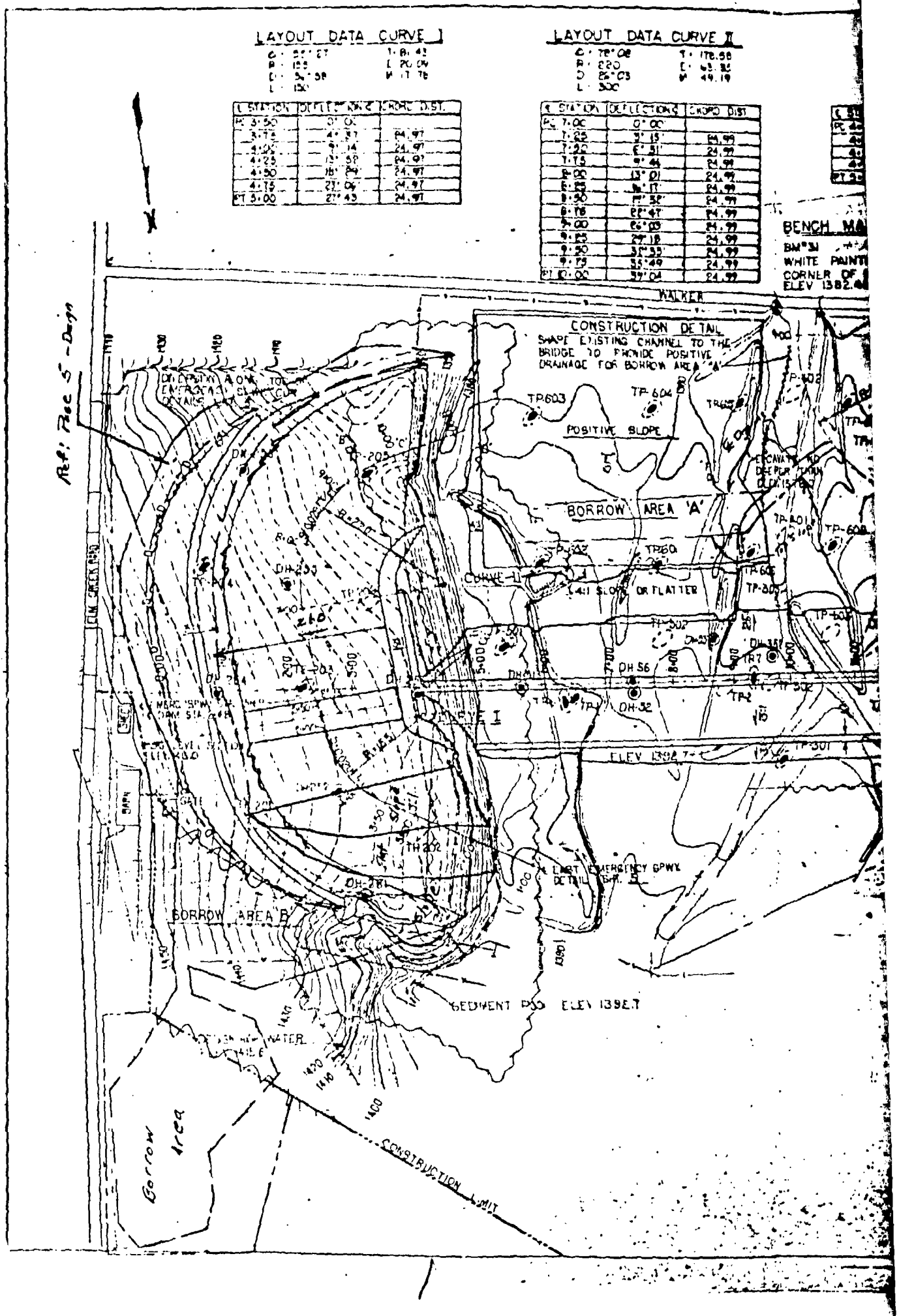
Δ = 55° 27'	T = 81.43
R = 125	L = 120.99
D = 34° 38'	M = 117.78
L = 150'	

℄ STATION	DEFLECTIONS	CHORD DIST.
PC 3+50	0° 00'	
3+75	4° 37'	24.97
4+00	9° 14'	24.97
4+25	13° 52'	24.97
4+50	18° 29'	24.97
4+75	23° 06'	24.97
PT 5+00	27° 43'	24.97

LAYOUT DATA CURVE II

Δ = 78° 08'	T = 178.58
R = 220	L = 65.82
D = 26° 03'	M = 49.19
L = 300	

℄ STATION	DEFLECTIONS	CHORD DIST
PC 7+00	0° 00'	
7+25	3° 15'	24.99
7+50	6° 51'	24.99
7+75	9° 44'	24.99
8+00	13° 01'	24.99
8+25	16° 17'	24.99
8+50	19° 32'	24.99
8+75	22° 47'	24.99
9+00	26° 03'	24.99
9+25	29° 18'	24.99
9+50	32° 33'	24.99
9+75	35° 49'	24.99
PT 10+00	39° 04'	24.99



LAYOUT DATA CURVE II

Δ = 22°55' T = 50.7
R = 250 E = 5.09
D = 22°55' M = 4.99
L = 100'

℄ STATION	DEFLECTION ∠	CHORD DIST
PC 4+00	0° 00'	
4+25	2° 52'	24.99
4+50	5° 44'	24.99
4+75	8° 36'	24.99
PT 5+00	11° 28'	24.99

LAYOUT DATA CURVE IV

Δ = 27°54' T = [illegible]
R = [illegible] E = [illegible]
D = [illegible] M = [illegible]
L = 200'

℄ STATION	DEFLECTION ∠	CHORD DIST
PC 7+00	0° 00'	
7+25	3° 30'	24.9?
7+50	6° 59'	24.9?
7+75	10° 29'	24.9?
8+00	13° 58'	24.9?
8+25	17° 28'	24.9?
8+50	20° 58'	24.9?
8+75	24° 27'	24.9?
PT 9+00	27° 57'	24.9?

LEGEND

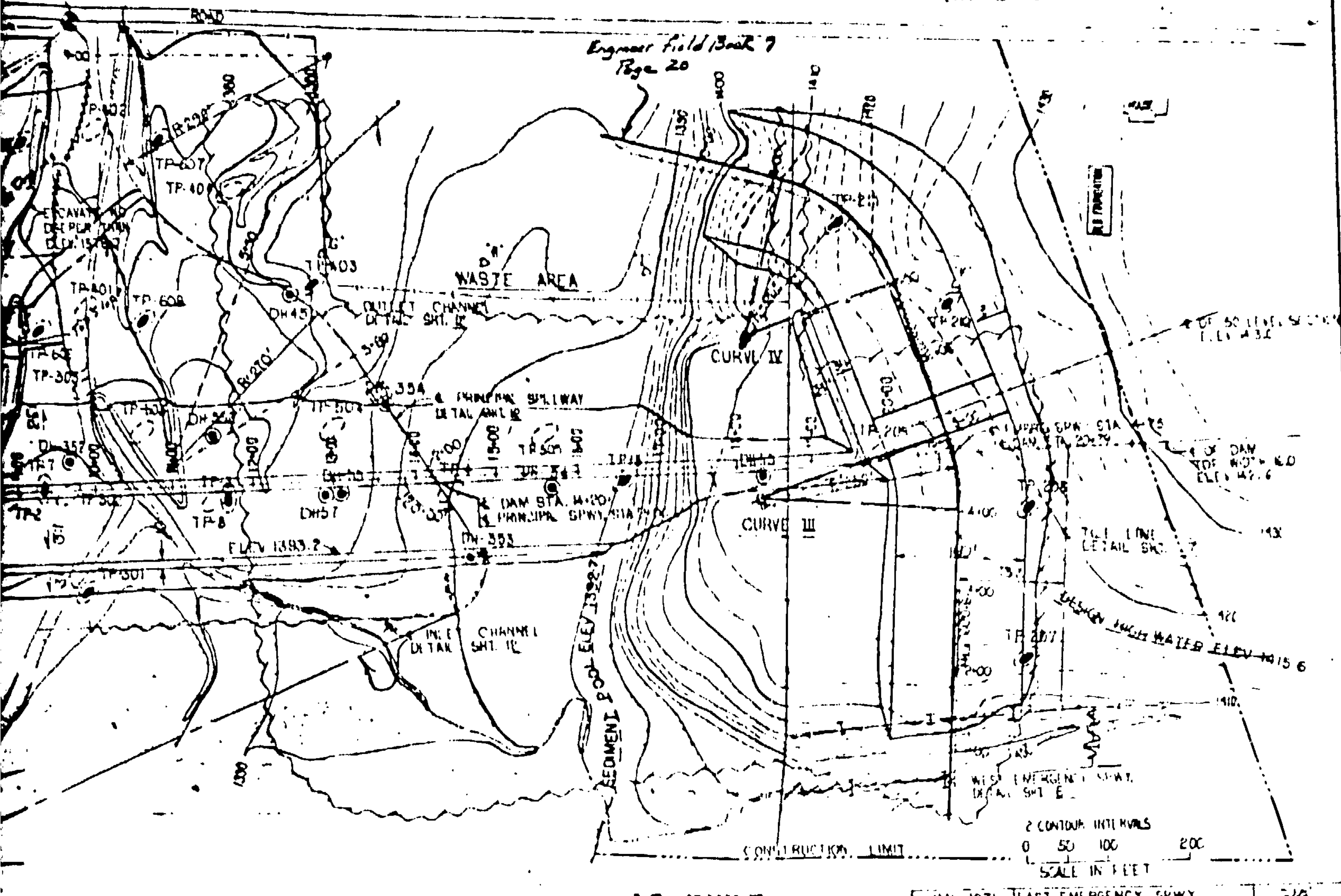
- CONSTRUCTION LIMIT
- DESIGN HIGH WATER
- SEDIMENT POOL
- ℄ OF STREAM
- 1380 CONTOUR LINES
- BENCH MARK
- FENCE LINE EXISTING
- TEST PIT LOGGED & SAMPLED
- WATER LINE
- DRILL HOLES
- BUILDINGS
- ROAD
- FENCE LINE (PLANNED)

FOUNDATION EXCAVATION DETAILS

EXCAVATE THE SILT, COLLUVIAL AND FLOOD PLAIN DEPOSIT MATERIAL [illegible] BY CH-SS FROM 1.0 TO 4.5 [illegible] FROM THE BASE WIDTH OF THE DAM IN THE FLOOD PLAIN AND THE RIGHT ABUTMENT (SEE SHEET 4)

BENCH MARK DESCRIPTIONS

BM#31
WHITE PAINTED SQUARE ON S.E CORNER OF STEEL BRIDGE ABUTMENT
ELEV 1382.46



AS BUILT
10/30/72

SOILS DETAILS
SEE SHEETS 21, 22 AND 23 FOR DESCRIPTION OF DRILL HOLES AND TEST PITS SHOWN ON SHEETS 3, 4, 5, 6, 7, 8, 9, AND 12.

JAN 1971	EAST EMERGENCY SPWY	APP'D
DATE	ITEM	

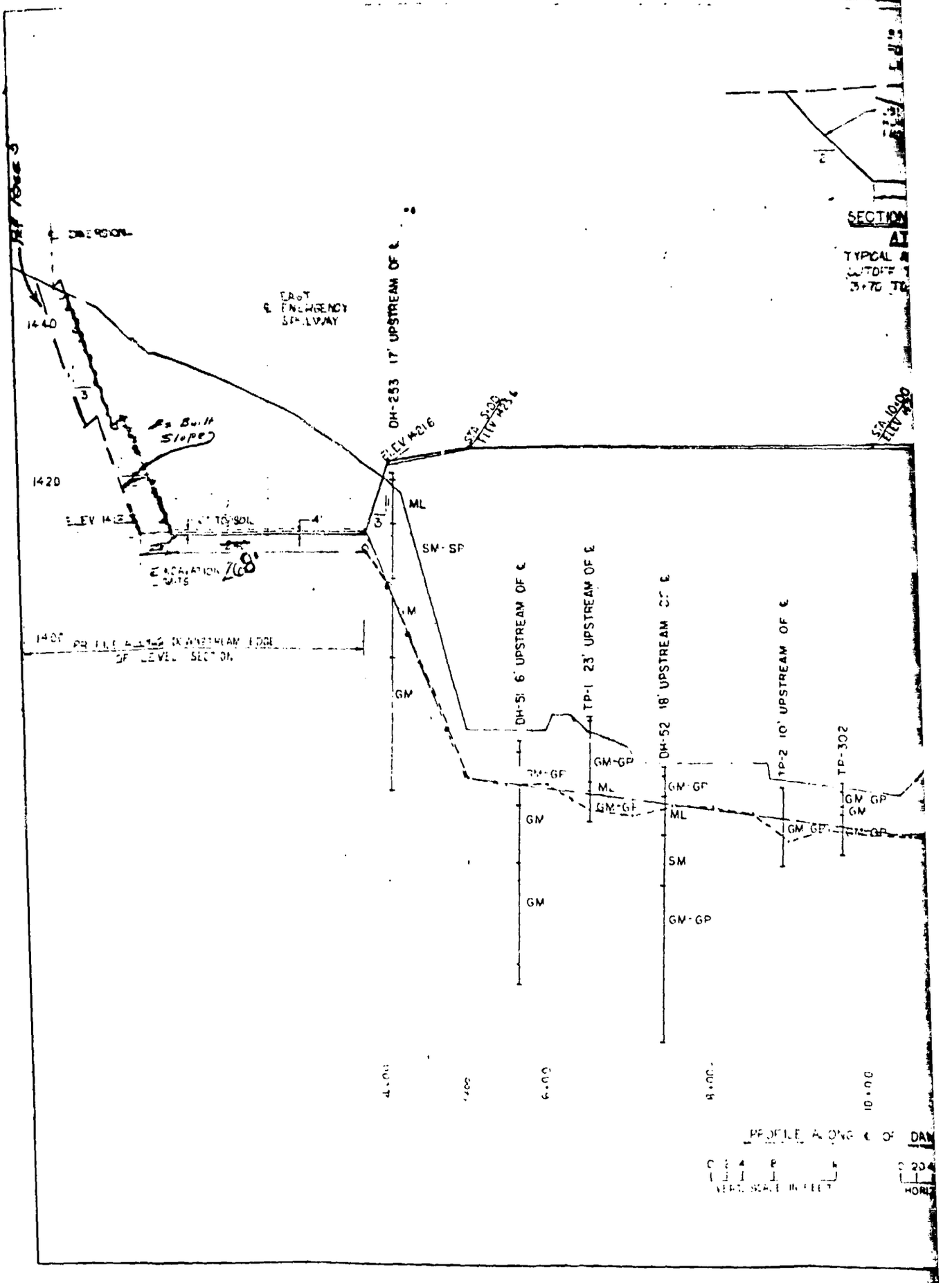
REVISIONS

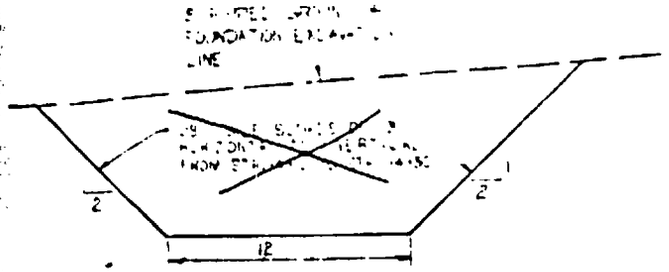
CONEWANGO CREEK WATERSHED PROJECT
SITE 16 A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK

PLAN OF STRUCTURAL WORKS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date	
Designed	J.E. POLULECH	9/69	Approved by
Drawn			
Traced	J DE VITA III	12-67	
Checked	M.N.	3/70	Sheet 25 — NY 2168-P


1440
1420
3
As Built Slope
ELEV 1416
4' TOPSOIL
EXCAVATION LIMITS
140' FROM U/S EDGE OF LEVEL SECTION
EAST EMERGENCY SPILLWAY
DH-253 17' UPSTREAM OF ℄
STA 5+00
ELEV 1420
STA 10+00
ELEV 1420
ML
SM-SP
SM
GM
DH-51 6' UPSTREAM OF ℄
TP-1 23' UPSTREAM OF ℄
DH-52 18' UPSTREAM OF ℄
TP-2 10' UPSTREAM OF ℄
TP-302
GM-GP
GM-GF
GM
ML
SM
GM-GP
GM
GM-GP
4.00
6.00
8.00
10.00
PROFILE ALONG ℄ OF DAM
VERT. SCALE IN FEET
HORIZ



SECTION OF CUTOFF TRENCH
AT STA. 10+00
TYPICAL ALONG ENTIRE LENGTH OF CUTOFF TRENCH FROM APPROX. STA 3+70 TO APPROX. STA. 20+00.

TOE OF CONSTRUCTED FILL

UPSTREAM OF ℄

DOWNSTREAM OF ℄

TP-2 10' UPSTREAM OF ℄

TP-302

TP-3 20' UPSTREAM OF ℄

DH-53 16' UPSTREAM OF ℄

TP-4 15' UPSTREAM OF ℄

DH-54 16 UPSTREAM OF ℄

TP-5 17' UPSTREAM OF ℄

DH-55

TP-209

GM GP
GM
GM GP
GM GP
GM GP
ML
GM
GM
GM
GM
GM
GM-GW
GM
GM
ML
ML
ML
ML

BOTTOM OF CUTOFF TRENCH

PROFILE ALONG DOWNSTREAM EDGE OF LEVEL SECTION

CUTOFF TRENCH EXCAVATION
FINAL DEPTH OF TRENCH TO BE DETERMINED BY THE ENGINEER AT THE TIME OF CONSTRUCTION

CUT OFF TRENCH - AS BUILT
ENGINEER FIELD BOOK 3
PAGES 22 48 49 50 52 53 54

10/30/72

JAN 1971 LEAST EMERGENCY SPWY
DATE ITEM
REVISIONS

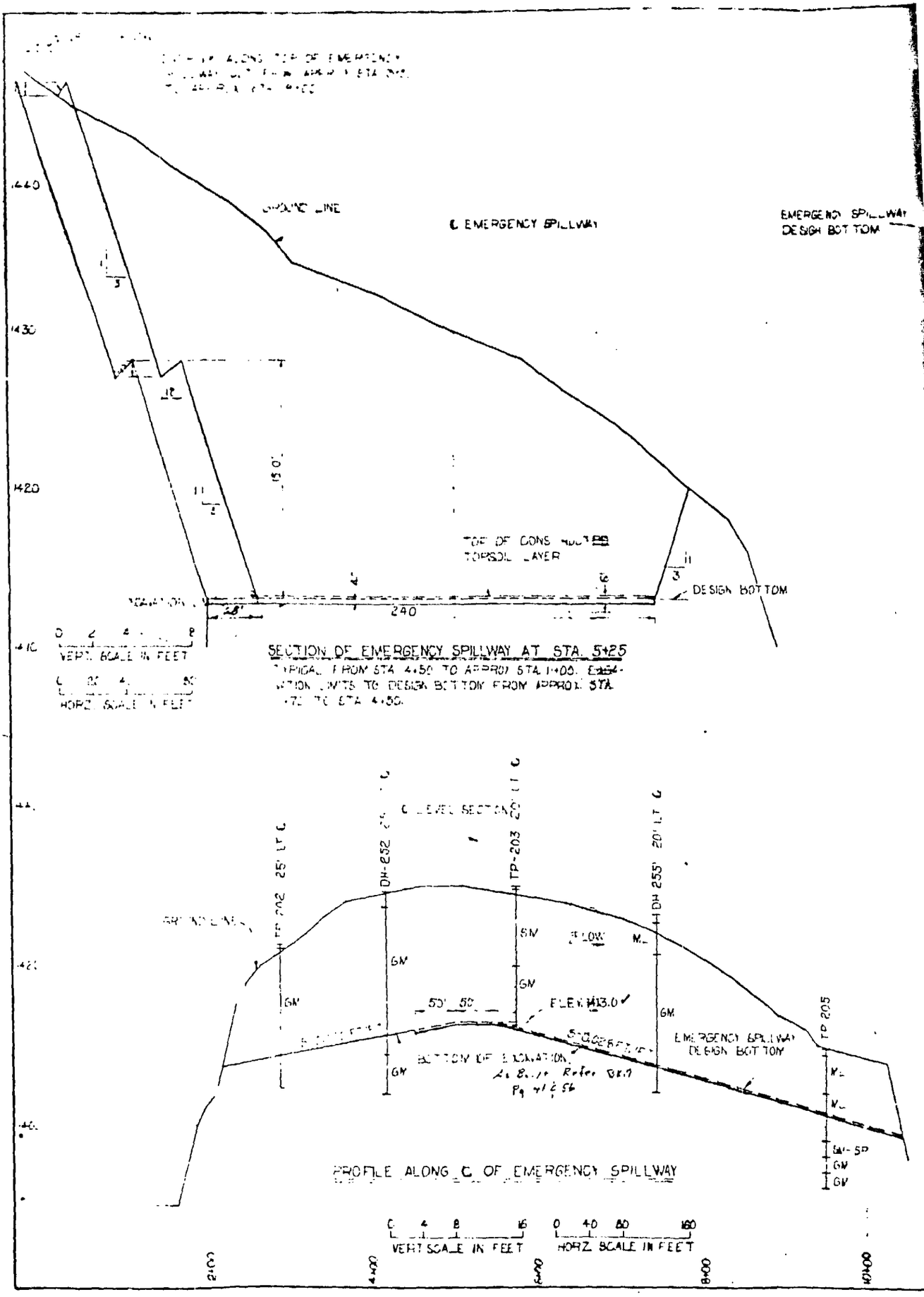
CONEWANGO CREEK WATERSHED PROJECT
SITE 16 A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
CUTOFF TRENCH EXCAVATION

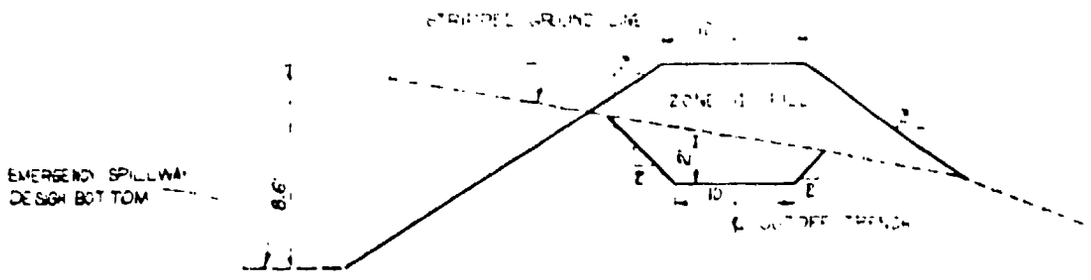
PROFILE ALONG ℄ OF DAM, ℄ LOOKING DOWNSTREAM

VERT. SCALE IN FEET
HOR. SCALE IN FEET

NY-2165-F

B-5

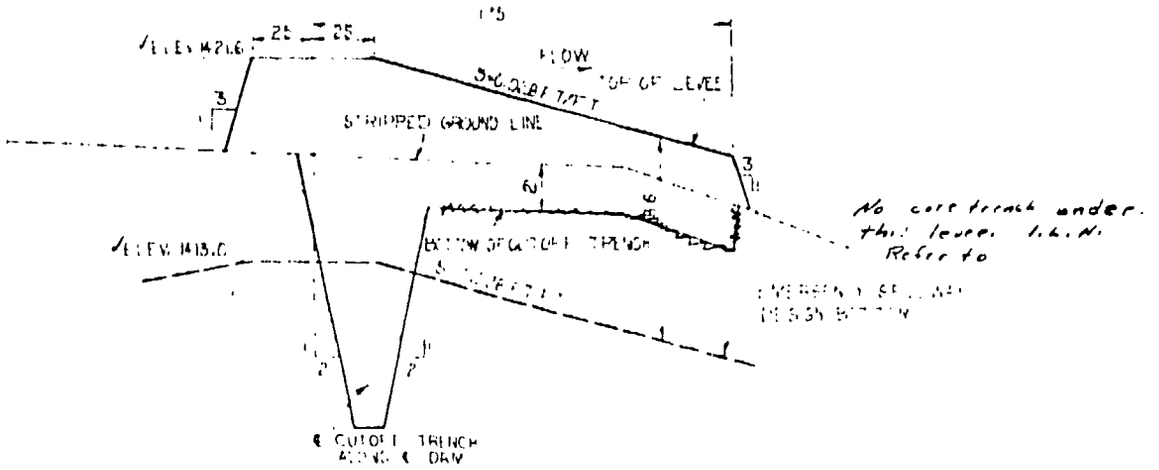

1440
1430
1420
1410
GROUND LINE
℄ EMERGENCY SPILLWAY
EMERGENCY SPILLWAY
DESIGN BOTTOM
TOP OF CONSTRUCTED
TOPSOIL LAYER
DESIGN BOTTOM
15.0'
240
VERT. SCALE IN FEET
HORZ. SCALE IN FEET
SECTION OF EMERGENCY SPILLWAY AT STA. 5+25
TYPICAL FROM STA 4+50 TO APPROX STA 1+00. EXCAVATION LIMITS TO DESIGN BOTTOM FROM APPROX STA 4+75 TO STA 4+50.
℄ LEVEE SECTION
TP-202 25' LT ℄
DH-252
TP-203
DH 255' 20' LT ℄
GM
SM
ELEV. 413.0
50'
50'
EMERGENCY SPILLWAY DESIGN BOTTOM
TP 205
BOTTOM OF EXCAVATION
Refer to Dwg
Pg 41 & 56
PROFILE ALONG ℄ OF EMERGENCY SPILLWAY
VERT SCALE IN FEET
HORZ SCALE IN FEET
2+00
4+00
6+00
8+00
10+00



SECTION OF LEVEE AT ℄ OF LEVEE SECTION
TYPICAL FROM UPSTREAM EDGE OF LEVEE SECTION TO ITS DOWNSTREAM FROM ℄ OF LEVEE SECTION

0 2 4 8 0 4 8 16
VERT. SCALE IN FEET HORZ. SCALE IN FEET

BOTTOM

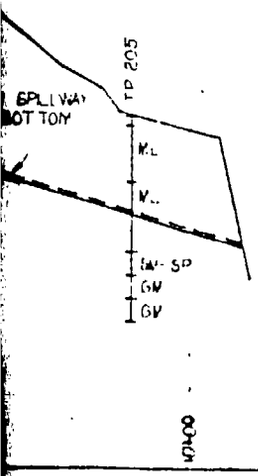


No core trench under this levee. I.G.N. Refer to

PROFILE ALONG ℄ OF LEVEE

0 8 4 8 0 20 40 80
VERT. SCALE IN FEET HORZ. SCALE IN FEET

10/30/72



DATE	ITEM	APP'D
JAN 1971	EMRGY SPILLWAY EXCAVATION & DIVERSION	
	REVISION	

CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
EAST EMERGENCY SPILLWAY

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

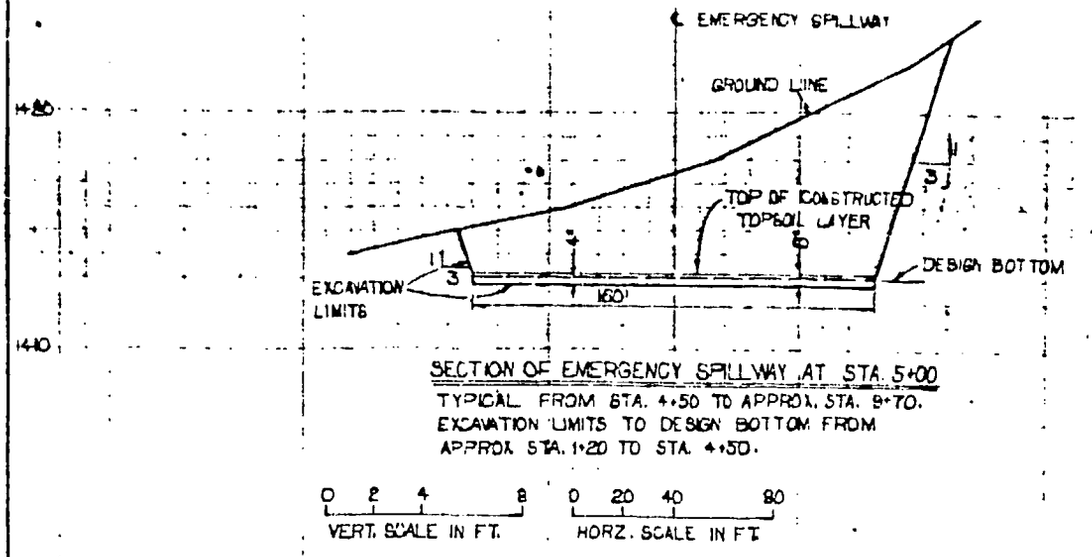
J. POLULECH 10/69
D. BURDICK 10/69
J. POLULECH 10/69

8/23 NY-2168-P

B-6

1

2

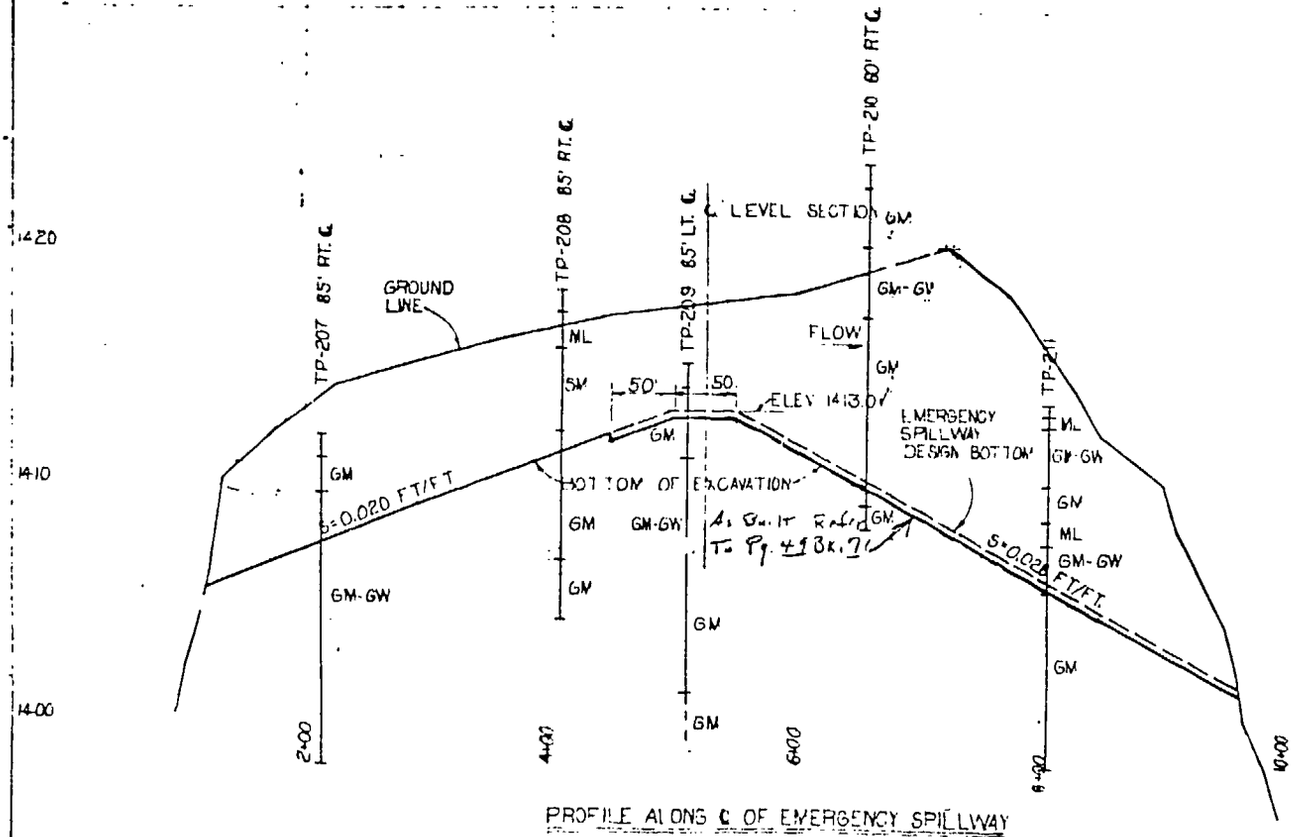


SECTION OF EMERGENCY SPILLWAY AT STA. 5+00

TYPICAL FROM STA. 4+50 TO APPROX. STA. 9+70. EXCAVATION LIMITS TO DESIGN BOTTOM FROM APPROX STA. 1+20 TO STA. 4+50.

0 2 4 8 VERT. SCALE IN FT.

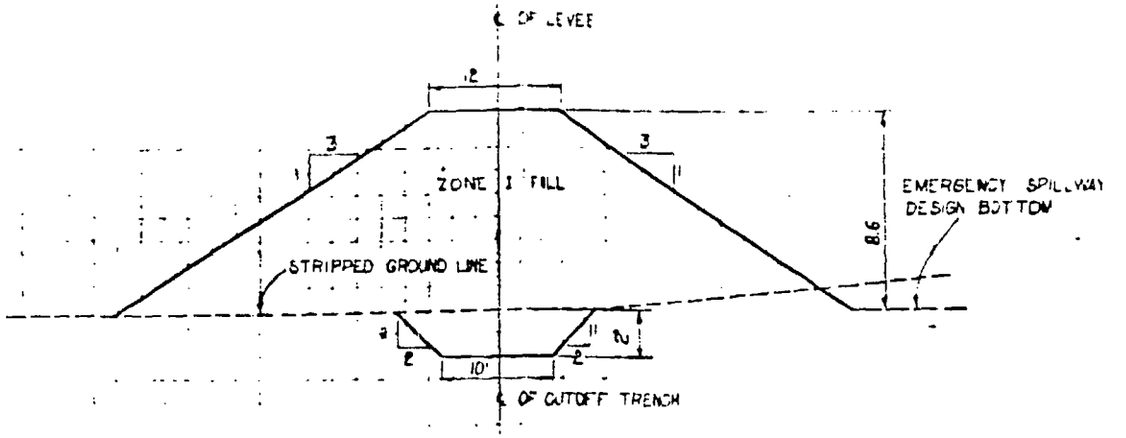
0 20 40 80 HORZ. SCALE IN FT.



PROFILE ALONG ℄ OF EMERGENCY SPILLWAY

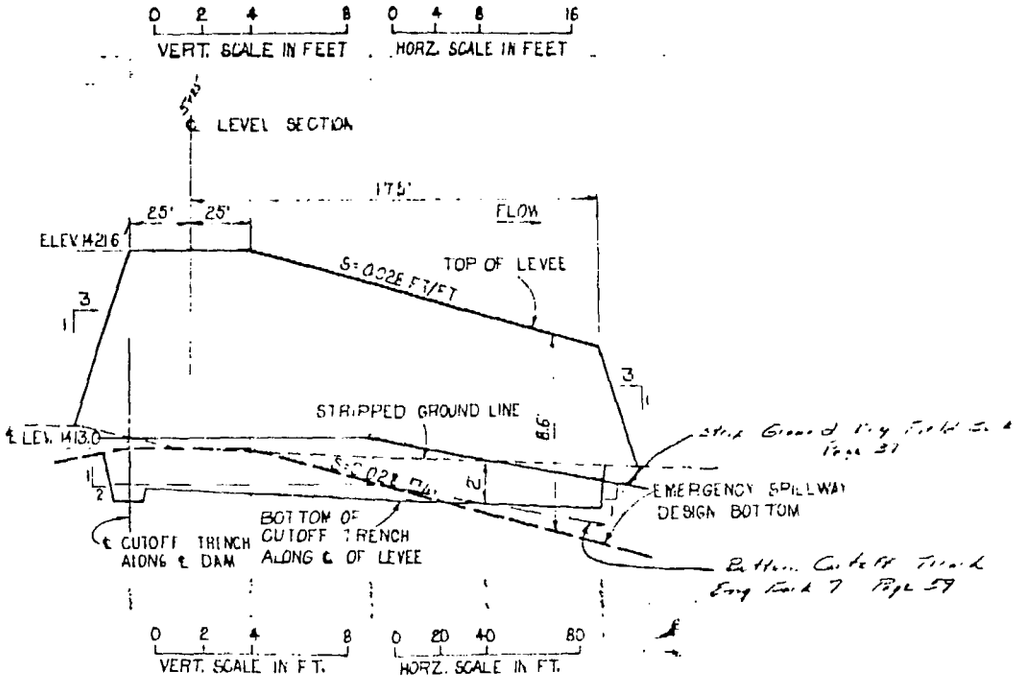
0 40 80 160 HORZ. SCALE IN FT.

0 2 4 8 VERT. SCALE IN FT.



SECTION OF LEVEE AT STA. 5+50 OF EMERGENCY SPILLWAY

TYPICAL FROM UPSTREAM EDGE OF LEVEE SECTION TO 175' DOWNSTREAM FROM ℄ OF LEVEE SECTION.



PROFILE ALONG ℄ OF LEVEE

10/30/72

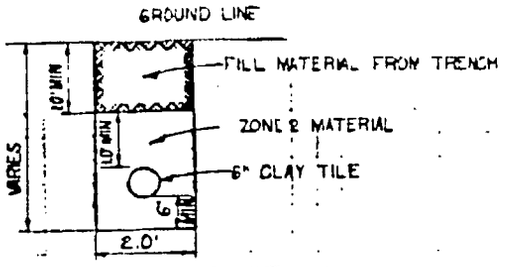
CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
WEST EMERGENCY SPILLWAY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

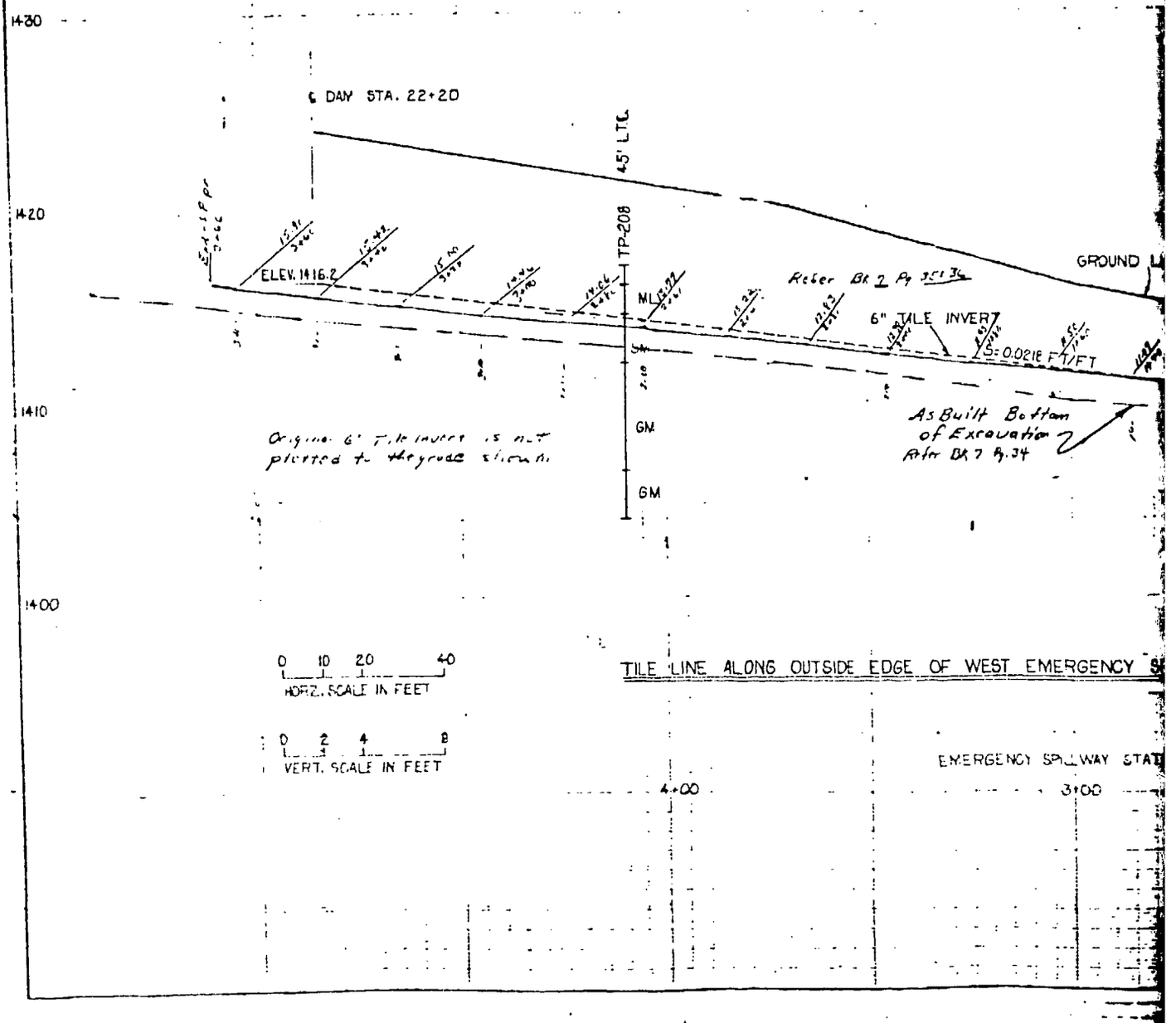
Designed	J. POLULECH	9/69	Approved by
Drawn	D. BURDICK	9/69	Title
Traced			Date
Checked	J. E. POLULECH	10/69	Sheet No. 6 / 23

NY-216B-F

B-7



SECTION OF TILE LINE
TYPICAL FROM ℄ DAM STA 22+26 TO
APPROX. EM SPLWY. STA 1+65

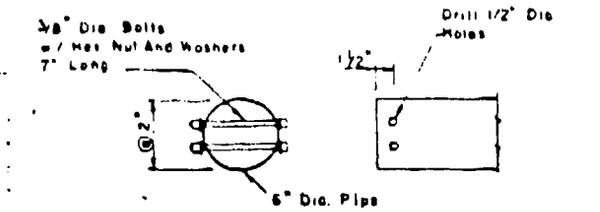


SUMMARY OF QUANTITIES

306 LIN FT 6" CLAY TILE
20 LIN FT 6" STEEL PIPE
1 SMALL ANIMAL GUARD

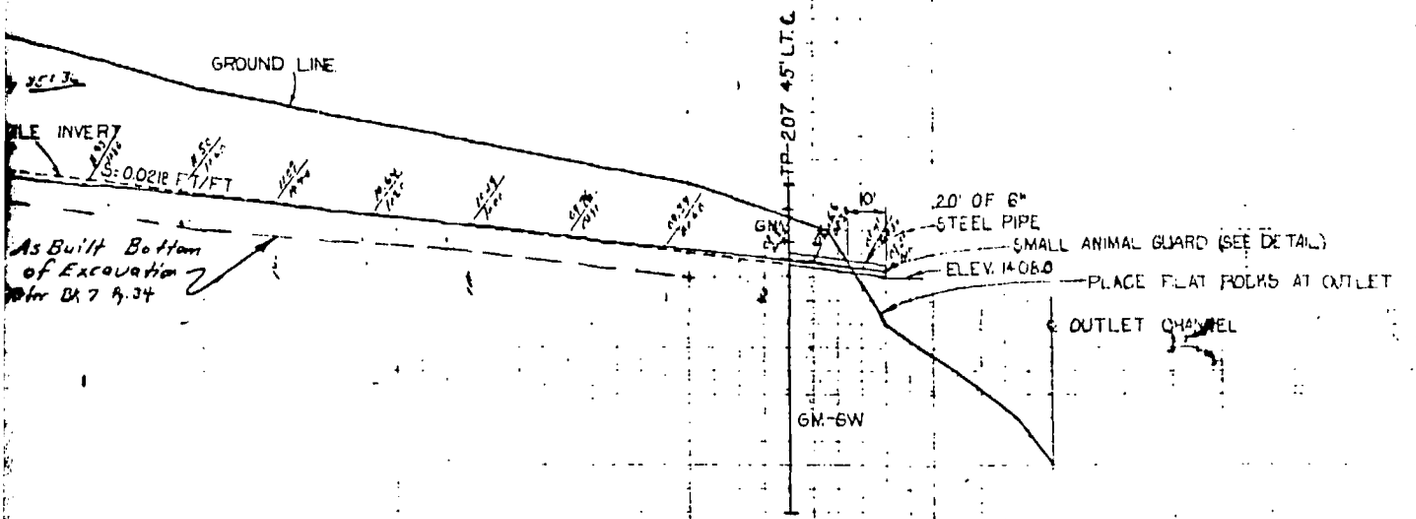
TILE LINE DETAILS

6" CLAY DRAIN TILE SHALL CONFORM TO SPECIFICATION 544 AND SHALL BE NON PERFORATED, EXTRA QUALITY, 6" DIAMETER



SMALL ANIMAL GUARD DETAILS

0" 6" 12"
Scale



AS BUILT
10/30/72

OF WEST EMERGENCY SPILLWAY

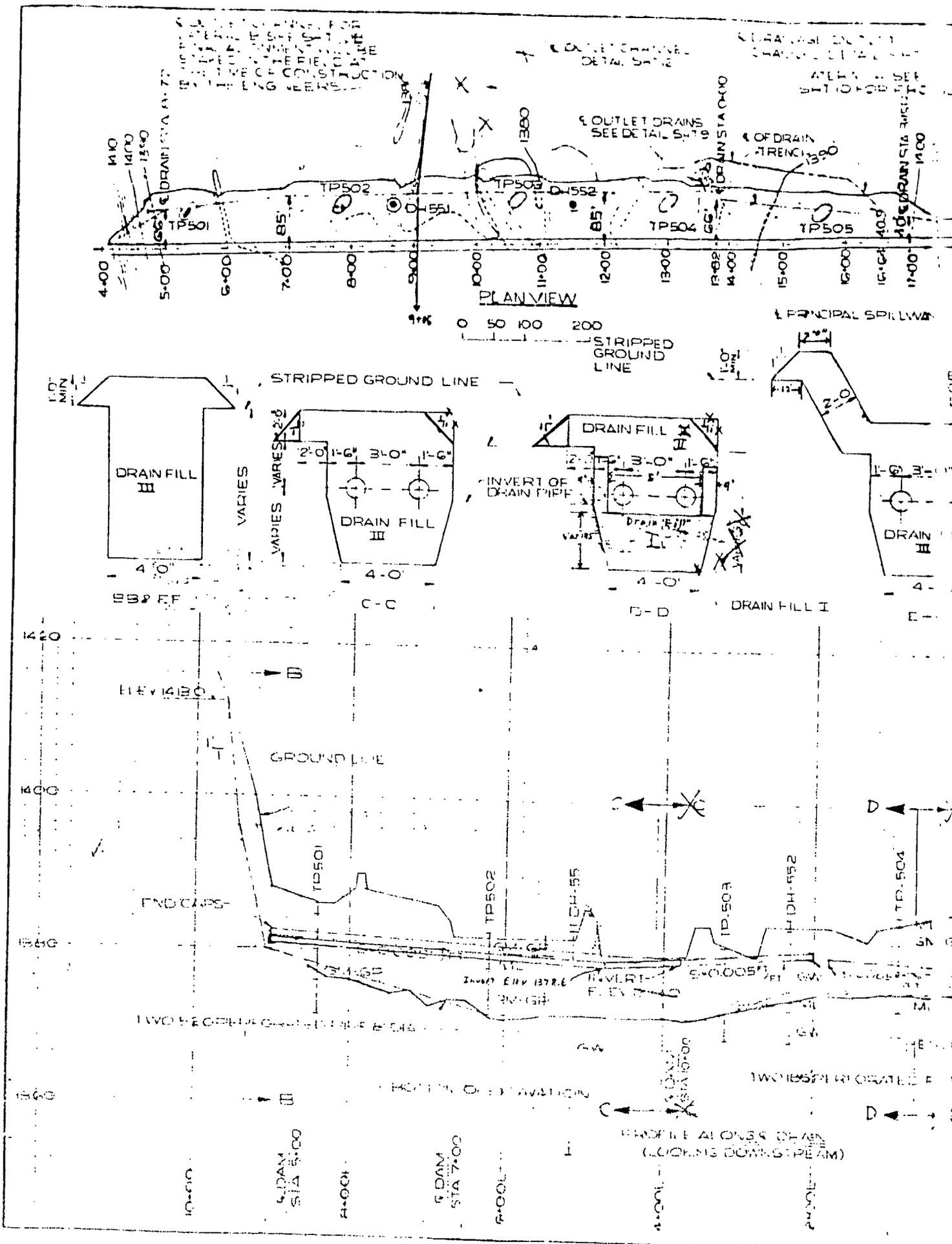
EMERGENCY SPILLWAY STATIONS — FEET

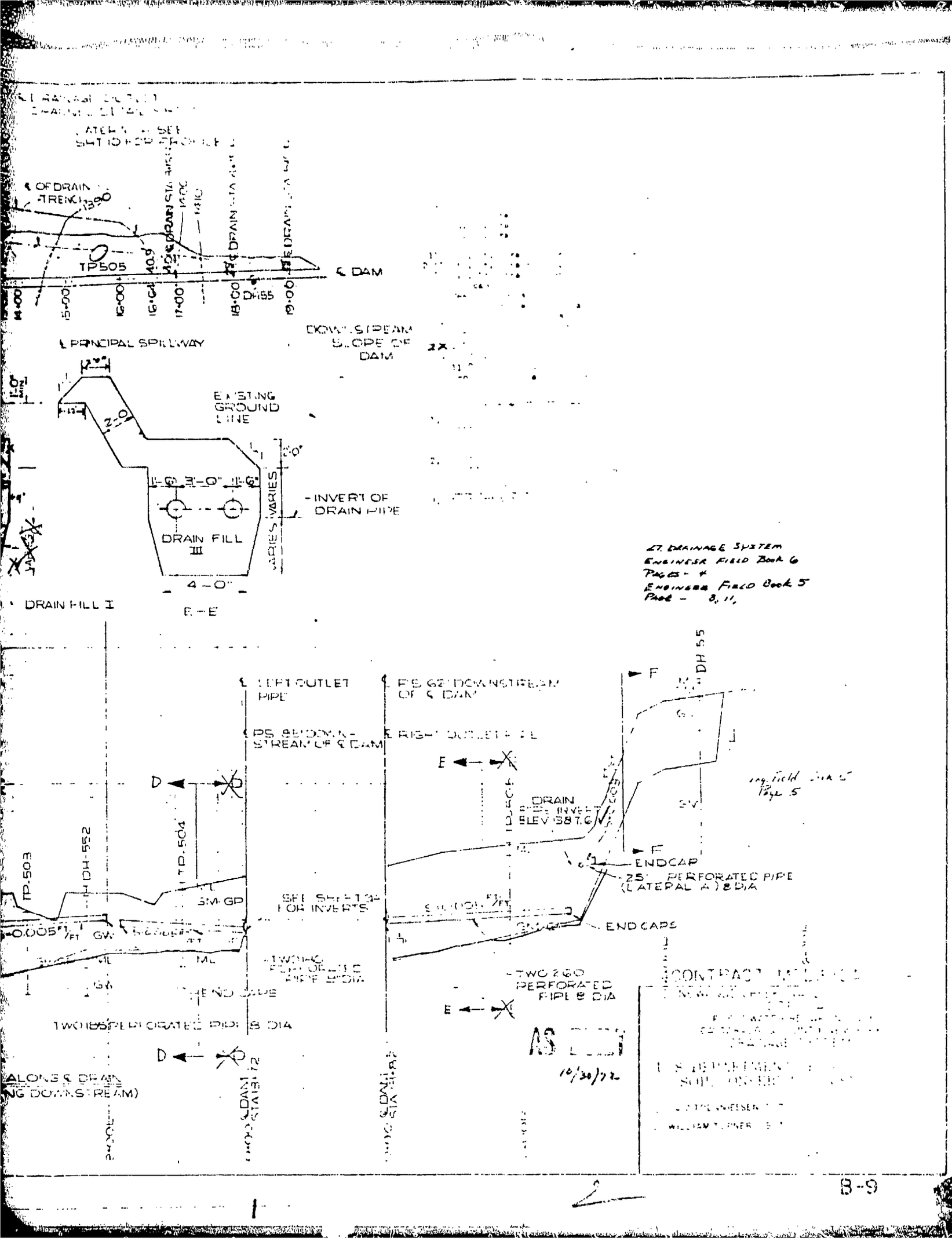
3+00 2+00 1+00

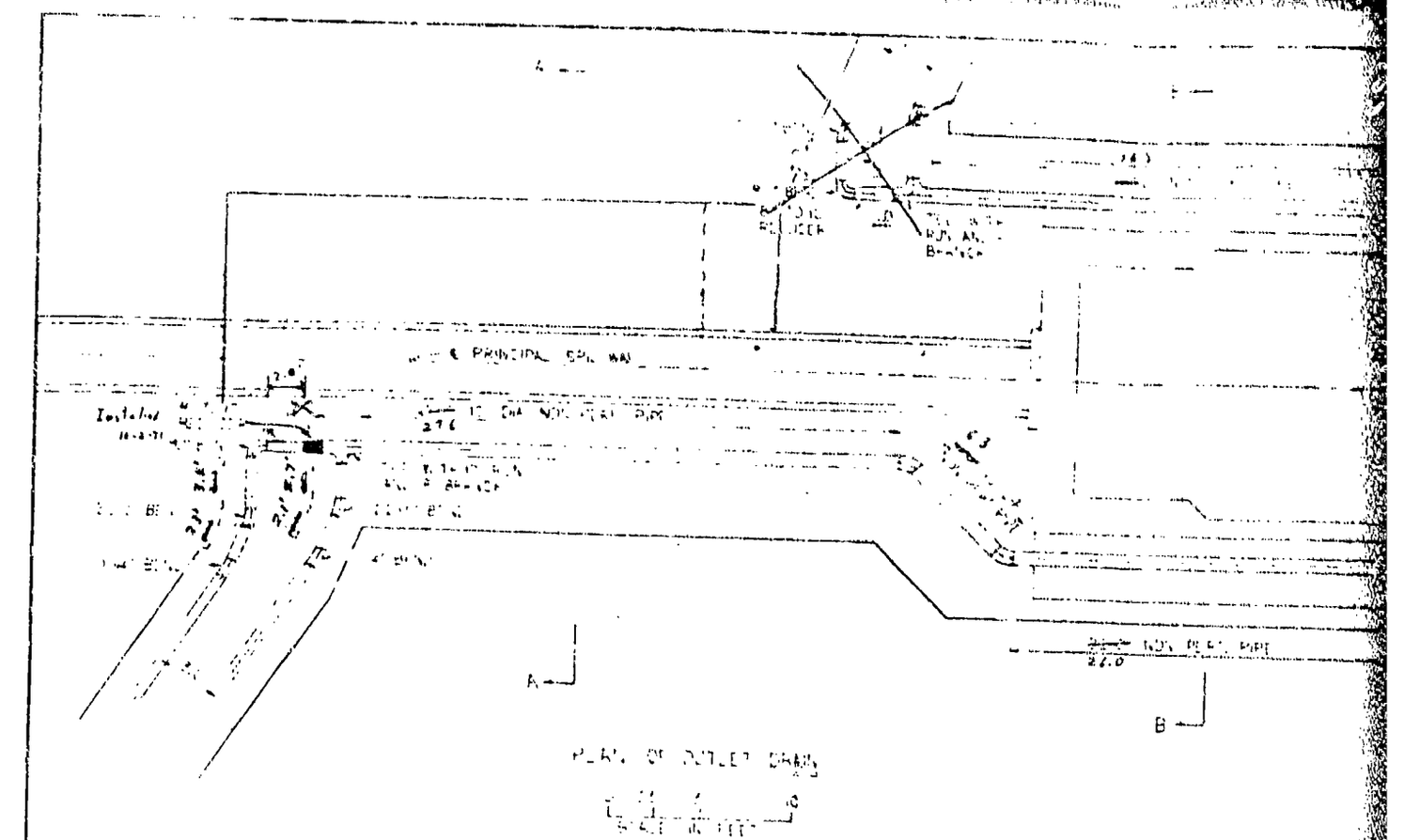
CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
TILE LINE DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

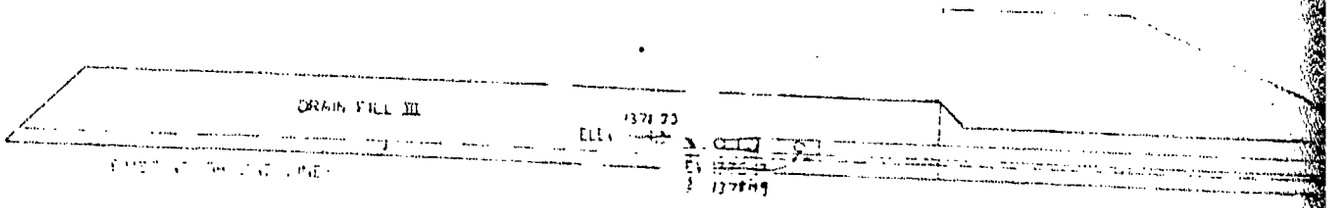
Designed	J. POLULECH	10/69	Approved
Drawn	D. BURDICK	10/69	Title
Traced			Sheet No. 7 of 23
Checked	J.E.P.	2/70	NY-216B-P


PLAN VIEW
STRIPPED GROUND LINE
DRAIN FILL III
DRAIN FILL I
INVERT OF DRAIN PIPE
GROUND LINE
END CAPS
TP501
TP502
TP503
TP504
TP505
DH-55
DH-552
PROFILE ALONG DRAIN
(LOOKING DOWNSTREAM)

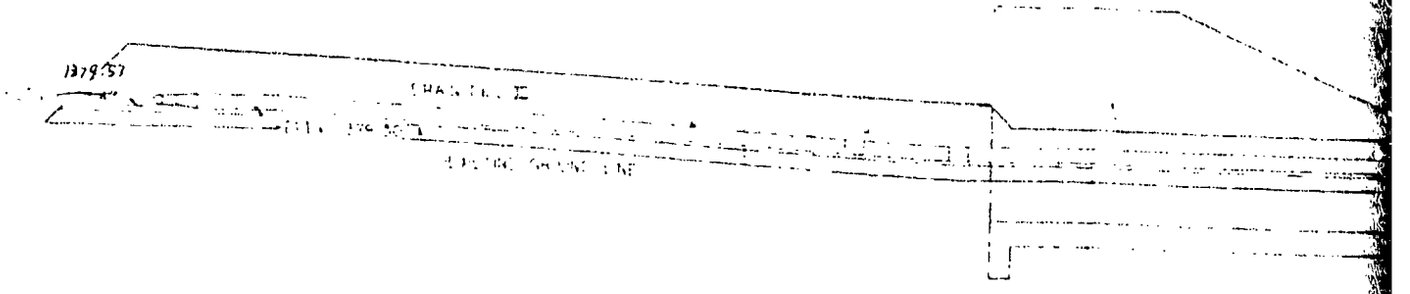

℄ OF DRAIN TRENCH
TP505
℄ DAM
DH55
DOWNSTREAM SLOPE OF DAM
2X
℄ PRINCIPAL SPILLWAY
EXISTING GROUND LINE
2-0
1'-6"
3'-0"
1'-6"
2'-0"
INVERT OF DRAIN PIPE
VARIES
DRAIN FILL III
4'-0"
E-E
DRAIN FILL I
LT. DRAINAGE SYSTEM
ENGINEER FIELD BOOK 6
PAGES - 4
ENGINEER FIELD BOOK 5
PAGE - 8, 11,
℄ LEFT OUTLET PIPE
℄ PS 62' DOWNSTREAM OF ℄ DAM
℄ PS 8' DOWNSTREAM OF ℄ DAM
℄ RIGHT OUTLET PIPE
DH55
F
F
D
E
DRAIN PIPE INVERT ELEV 88 T.C.
ENDCAP
25' PERFORATED PIPE (LATERAL A) 8 DIA
TP503
DH552
TP504
SM GP
SEE SHEET 34 FOR INVERTS
0.005 FT/FT GW
ML
SM
TWO 8 DIA PERFORATED PIPE 8 DIA
END CAPS
TWO 2 60 PERFORATED PIPE 8 DIA
E
D
ALONG ℄ DRAIN
NG DOWNSTREAM)
℄ DAM STA 1+72
℄ DAM STA 1+82
AS
10/30/72
CONTRACT
U.S. DEPARTMENT
SOIL CONSER
STATE ENGINEER
WILLIAM TURNER
engineer field book 5
page 5



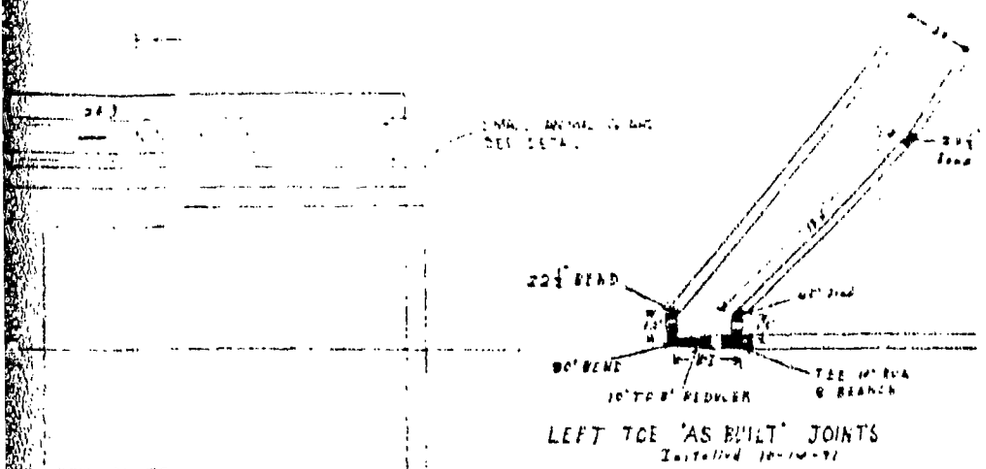
PLAN OF OUTLET DRAIN



SECTION ALONG LEFT OUTLET DRAIN

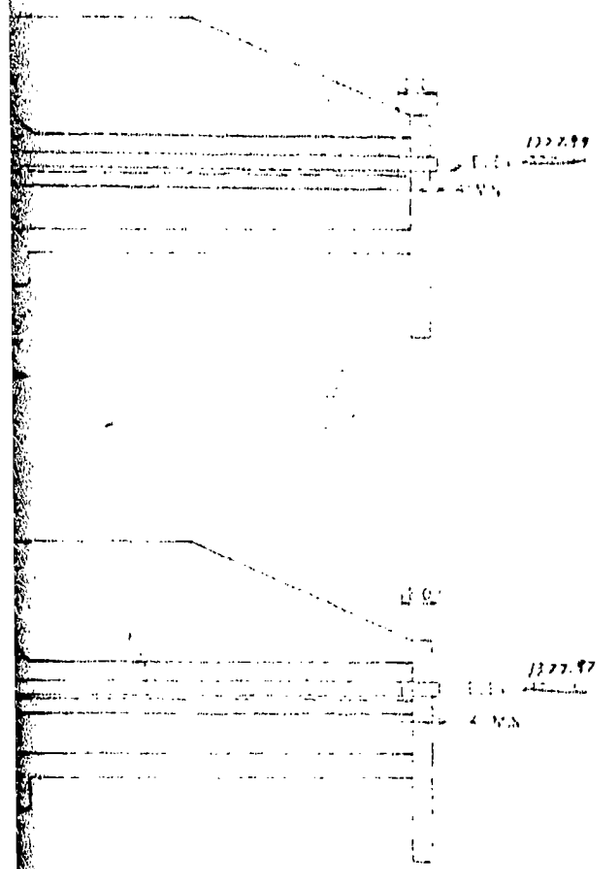


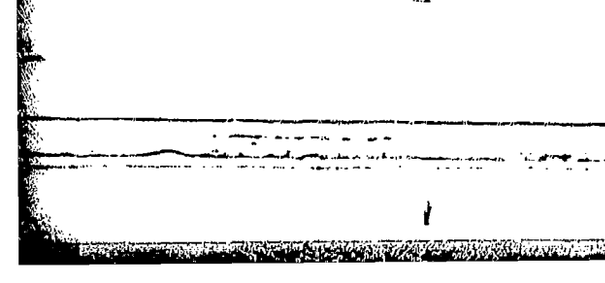
SECTION ALONG RIGHT OUTLET DRAIN

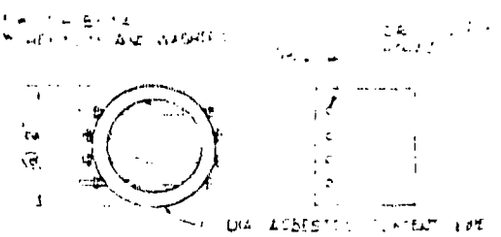


LEFT TOE 'AS BUILT' JOINTS
Installed 10-10-72

B

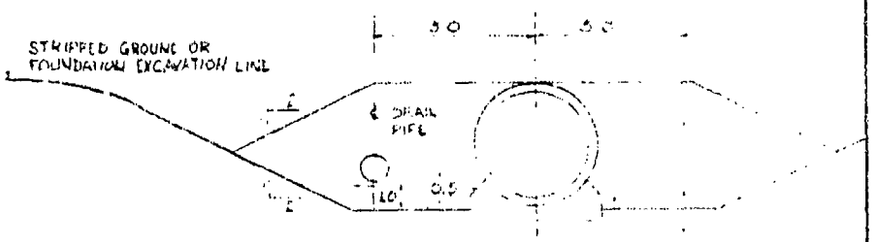




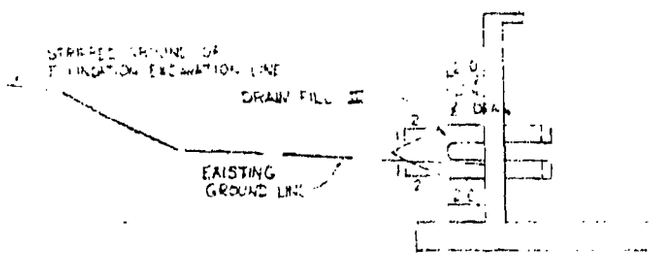


DIA ASBESTOS CEMENT PIPE

SMALL ANIMAL GUARD DETAIL

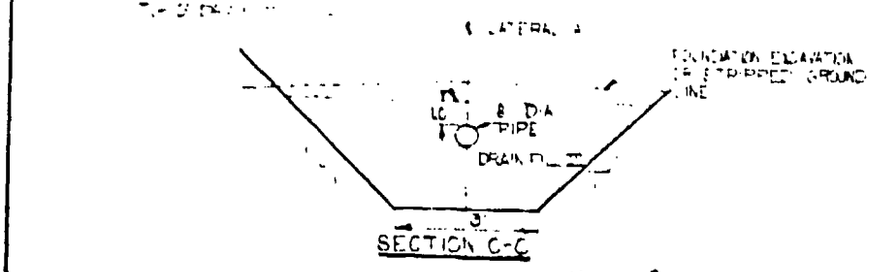


SECTION A-A

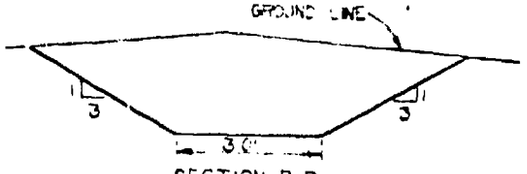


SECTION B-B

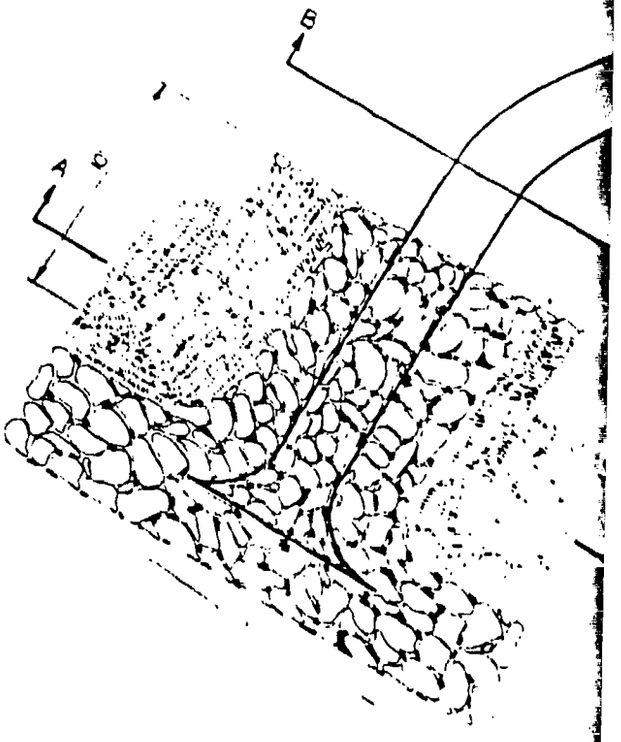
AS BUILT
10/30/72



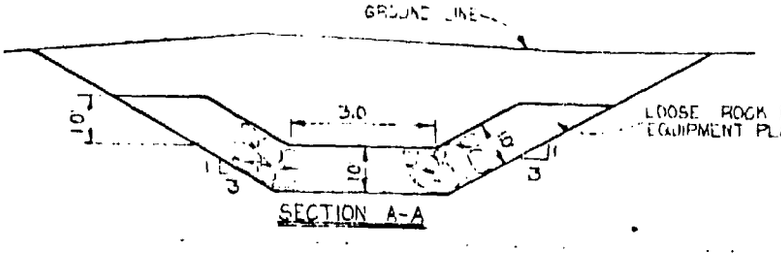
SECTION C-C



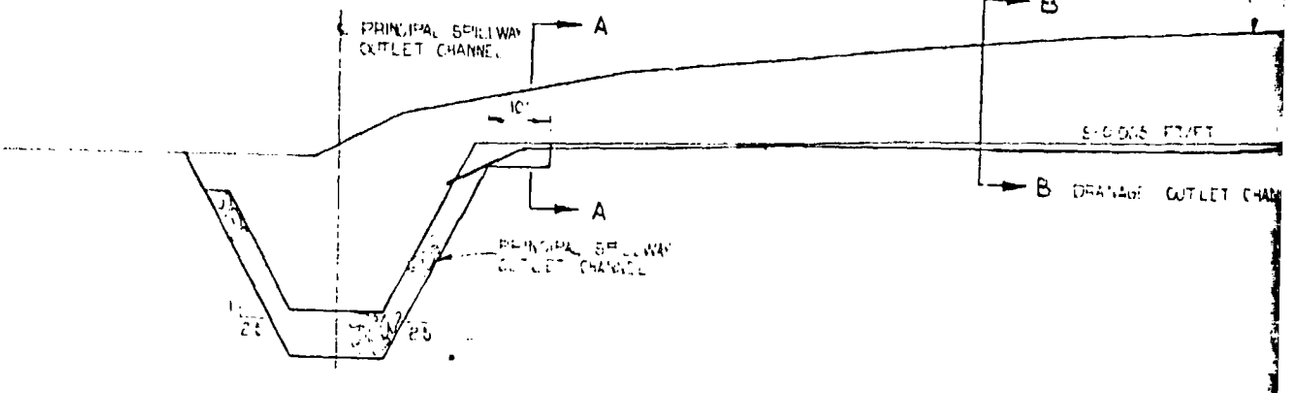
SECTION B-B



PLAN VIEW OF OUTLET
NOT TO SCALE

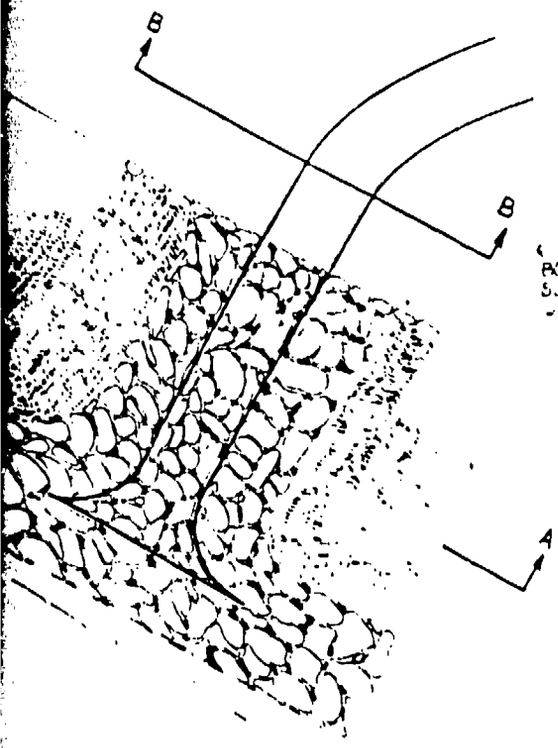


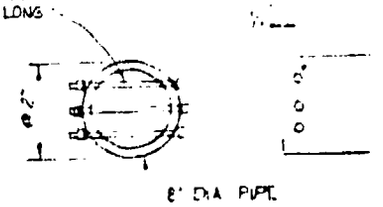
SECTION A-A

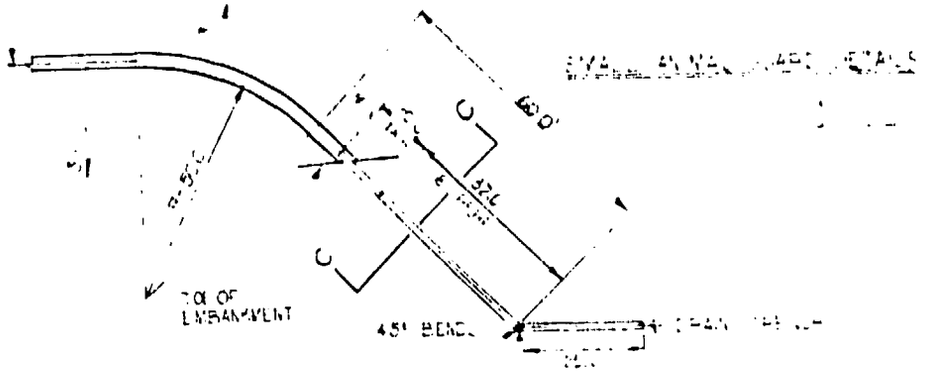


PROFILE ALONG ℄ LATERAL A

0 2 4 8 0 10 20 40
VERT SCALE IN FEET HORZ SCALE IN FEET

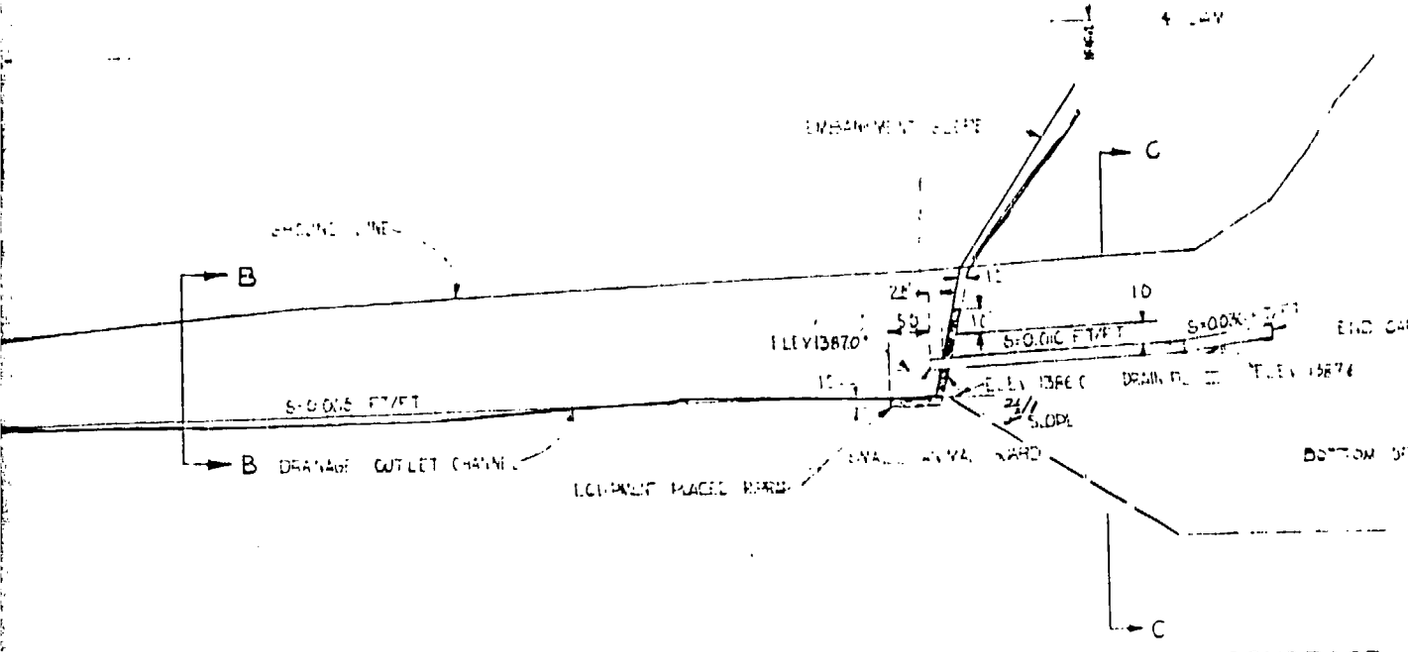






N VIEW OF OUTLET
T TO SCALE

PLAN VIEW OF LATERAL A



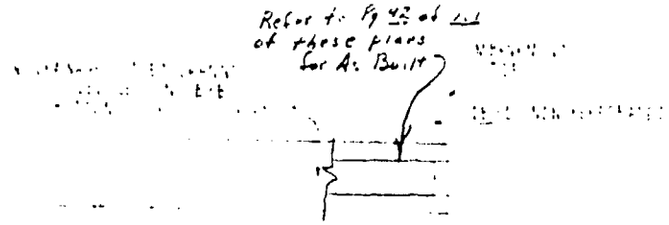
PROFILE ALONG ℄ LATERAL A

0 2 4 8 0 10 20 40
VERT. SCALE IN FEET HORZ. SCALE IN FEET

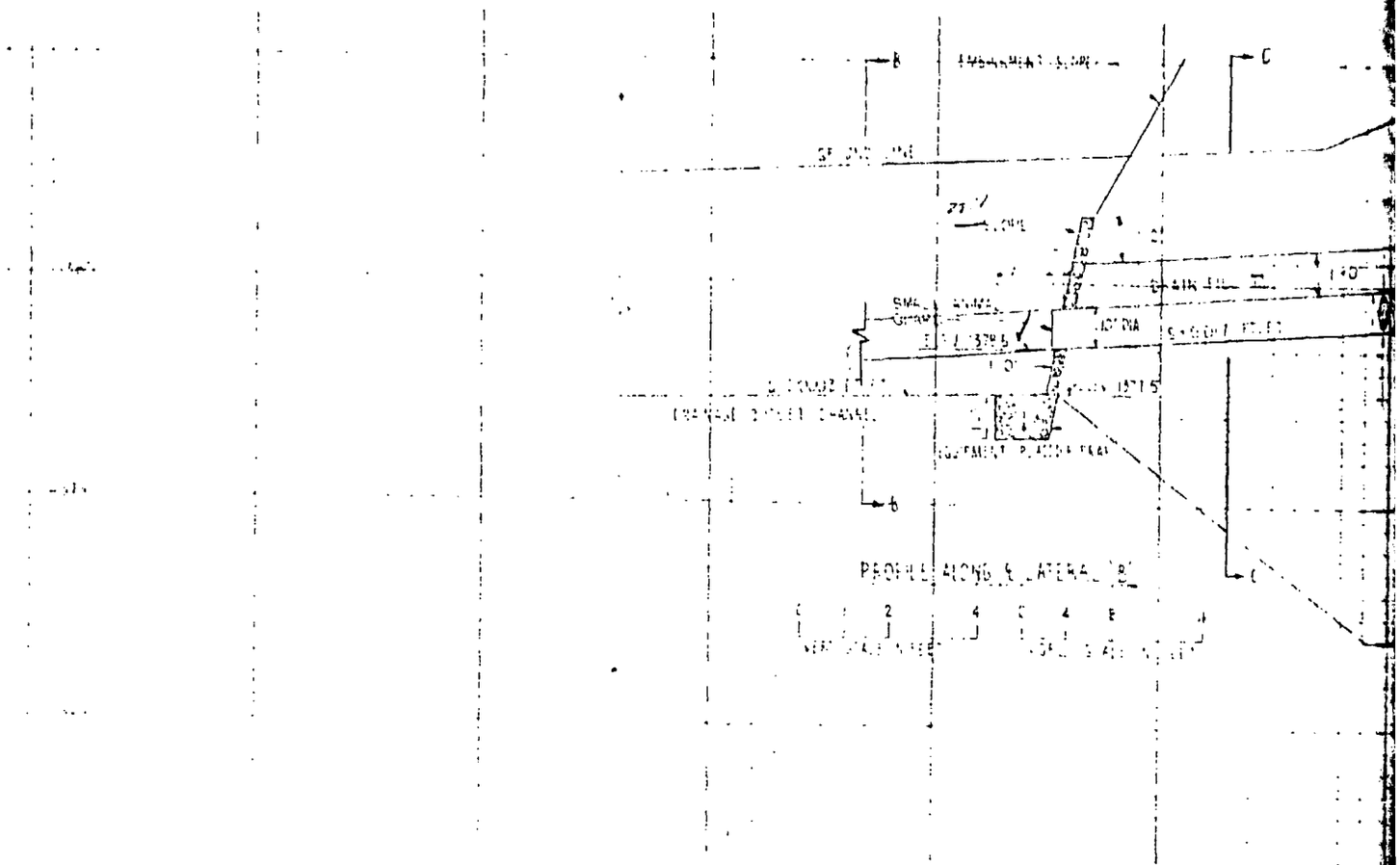
10/30/72

CONTRACT MODIFICATION #1
COLEWAUG CREEK WATERSHED
SITE 16A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
DRAINAGE SYSTEM

J. FOLLETH 3-70
D. BURDICK 3-70
MN 3-70 SCS-NY-210-F-D

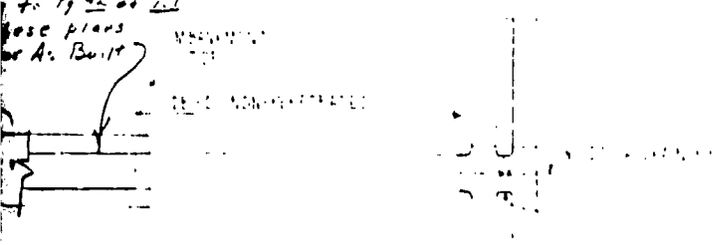


PLAN VIEW OF LATERAL 'B'



PROFILE ALONG 'B' LATERAL

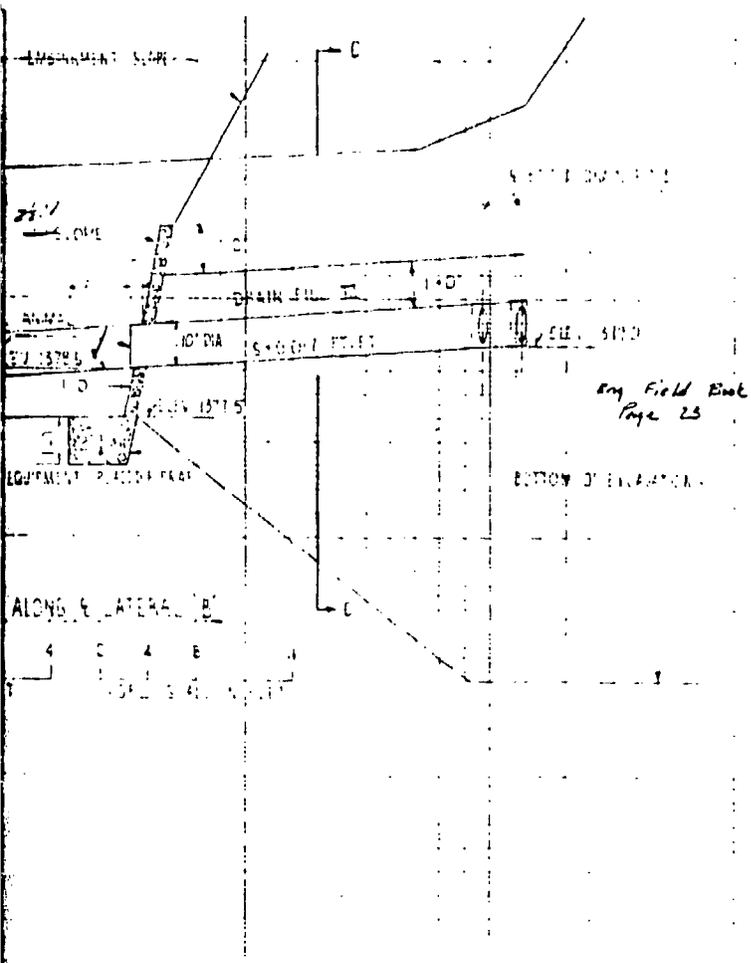
to Pg 42 of 44
these plans
for As Built



SMALL ANIMAL GLARE [illegible]

1. Change slope of riprap upstream side would more to 2:1 slope
2. same for other outlet

VIEW OF LATERAL "B"
0 SCALE



Eng Field Book 6
Page 23

ALONG LATERAL "B"

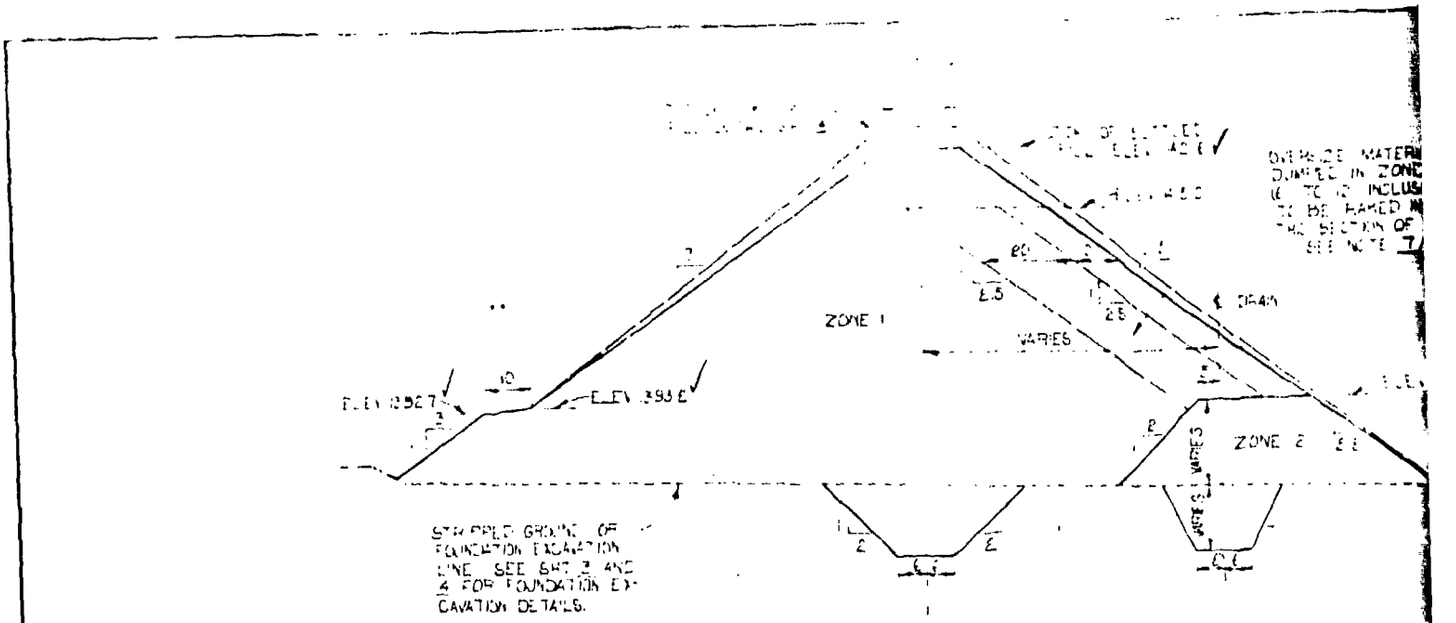
AS BUILT
10/30/72

CONTRACT MODIFICATION

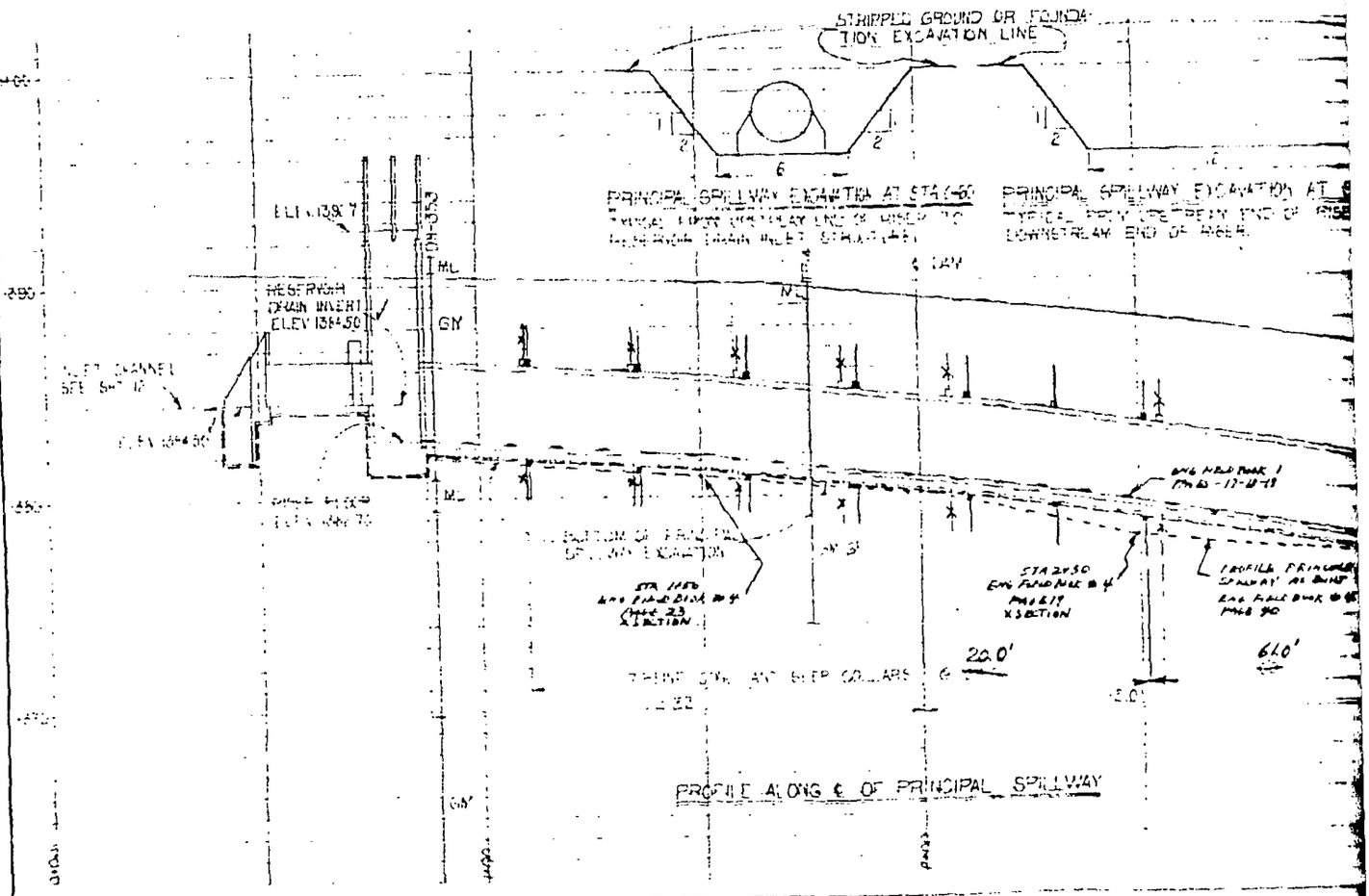
CONE WANGO CREEK WATERSHED
SUB AREA
DRAINAGE SYSTEM
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

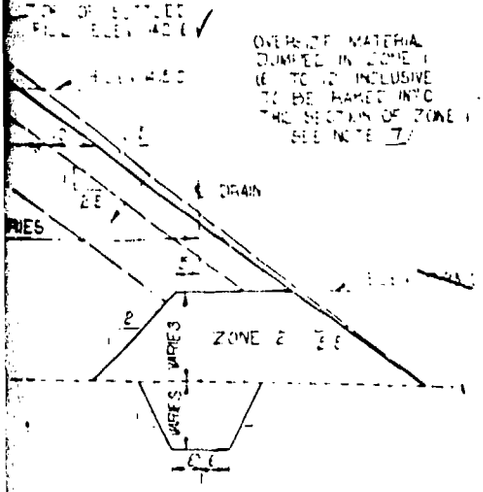
2

B-12



SECTION OF DAM AT STA 12+00
TYPICAL FROM APPROX STA 3+95 TO APPROX STA 19+70.





EARTH FILL REQUIREMENTS

ZONE	MATERIAL 1/	MAX. LIFT THICKNESS 3/	MAX. LIFT THICKNESS	MIN. REQUIRED WATER CONTENT 4/	COMPACTION 5/ CLASS	COMPACTION 5/ DEFINITION
1	Materials represented by: TP 204 from 1.0' to 14.0' TP 205 from 0.8 to 5.5' TP 207 from 1.0' to 2.5' TP 1 from 4.5' to 13.5'	6"	9"	2 Percentage points below optimum	A	95% of maximum density by ASTM D-698 Method "C"
2	Materials represented by: TP 602 from 1.0 to 1.7' TP 603 from 1.0 to 5.0' TP 604 from 0.0 to 4.5' TP 605 from 0.0 to 6.0' Plus the oversize material removed from Zone 1	12"	18"	5' See Note	C	Four passes per layer of fill by a smooth wheel vibrating roller at least 72" wide, weighing at least one ton (Static Service weight per foot of width) and capable of exerting a dynamic impact of at least 20,000 pounds at the rate of at least 1,200 times per minute

1/ The placement table indicates estimated use of material

2/ a. Maximum rock size placed in backfill compacted by means of hand tamping, or by mills directed power tampers or plate vibrators shall be 3".
b. Oversize material (6" to 12" inclusive) will be graded within zone 2, so that the larger rocks are placed toward the downstream toe. Oversize material will not be exposed on the upstream slope. Material larger than 3" will not be placed within 2' of the asbestos-cement pressure pipe.

3/ Maximum lift thickness prior to compaction.

4/ Water content at time of compaction.

5/ Thoroughly wet but:
a. Not more than 11% moisture content based on the material passing the 3/4" sieve unless modified by the engineer at the time of construction.
OR:
b. Not so wet as to cause adherence of the soil to the wheels or tracks of equipment, nor to cause bogging down of equipment.

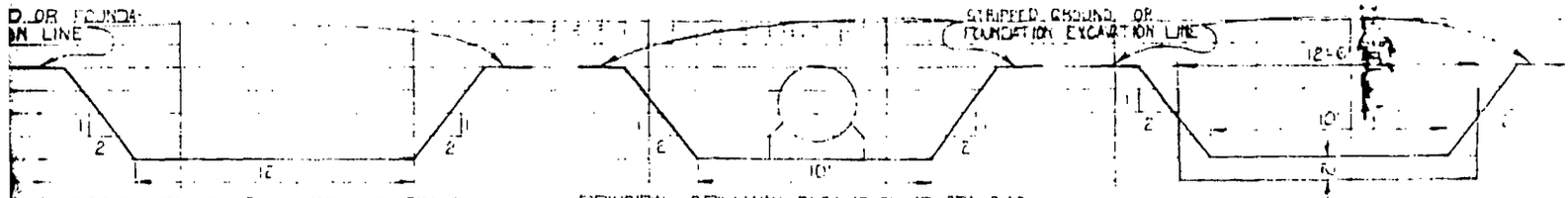
6/ For typical compaction curve see sheet 21.

7/ When oversize material is raked into this section, use zone 2 compaction requirements. Otherwise use zone 1 compaction requirements. The oversize material (6" to 12" inclusive) will be graded within this section, so that the larger rocks are placed toward the downstream slope.

CONSTRUCTION DETAILS

1. Zone boundaries indicated are approximate. Adjustments will be made by the engineer to permit the contractor to utilize all useable required excavation within the neat lines of the embankment.

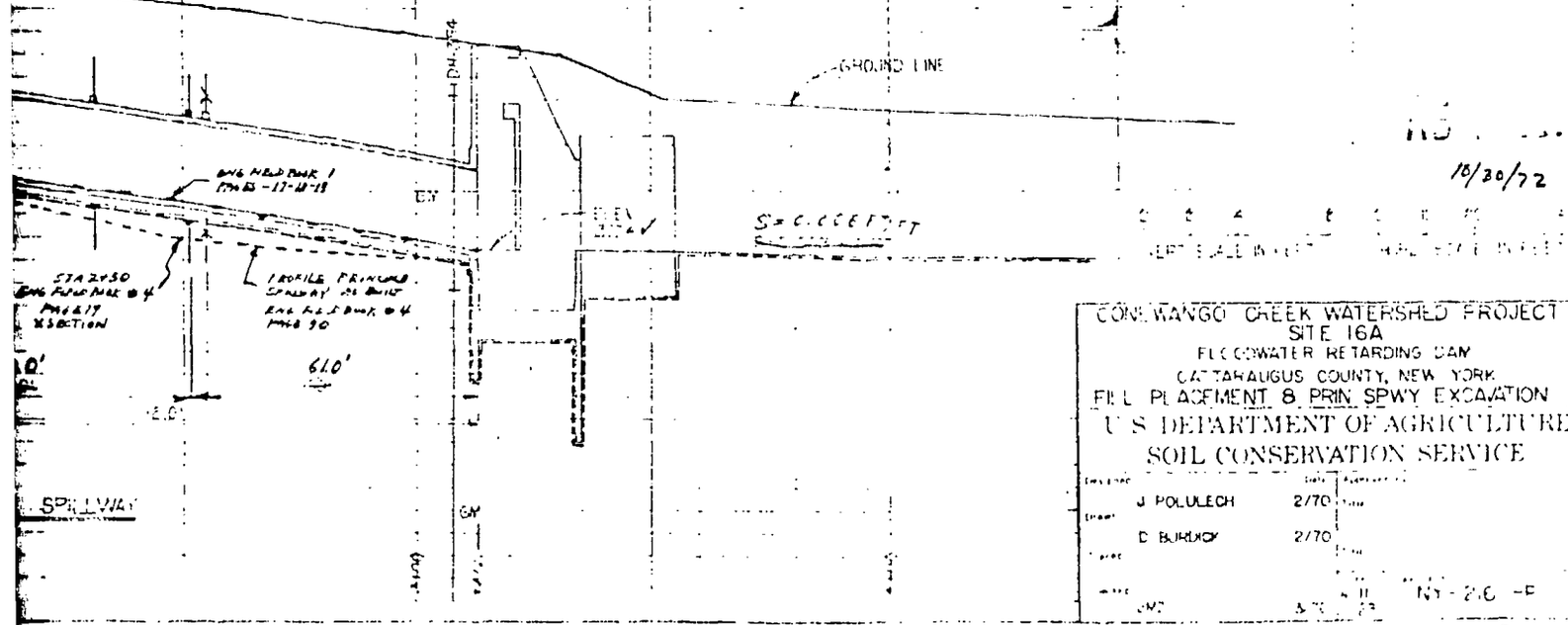
2. Topsoil that is suitable for use and not used on the specified areas of the emergency spillways, shall be incorporated within the slopes of the earth fill as directed by the engineer.



PRINCIPAL SPILLWAY EXCAVATION AT STA 0+60
TYPICAL FROM UPSTREAM END OF INSERT TO DOWNSTREAM END OF RISER.

PRINCIPAL SPILLWAY EXCAVATION AT STA 2+00
TYPICAL FROM DOWNSTREAM END OF RISER TO UPSTREAM END OF IMPACT BASIN.

PRINCIPAL SPILLWAY EXCAVATION AT ANTI-SEEP COLLARS



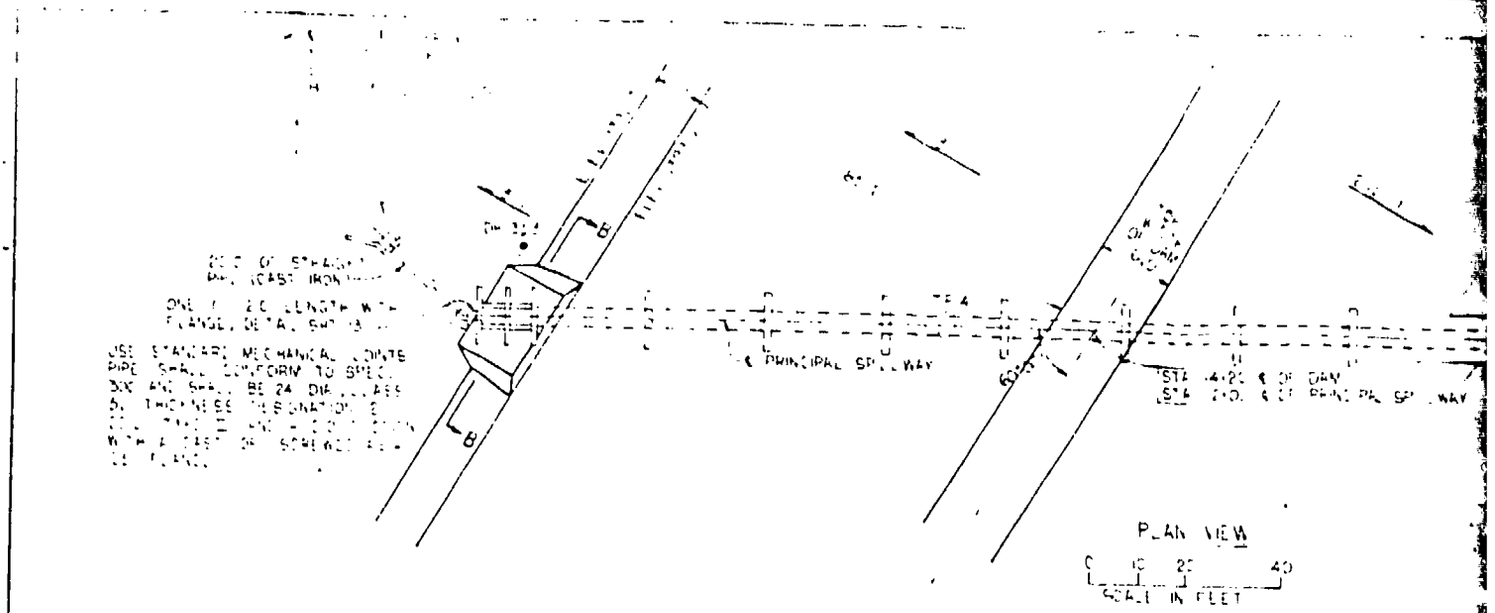
10/30/72

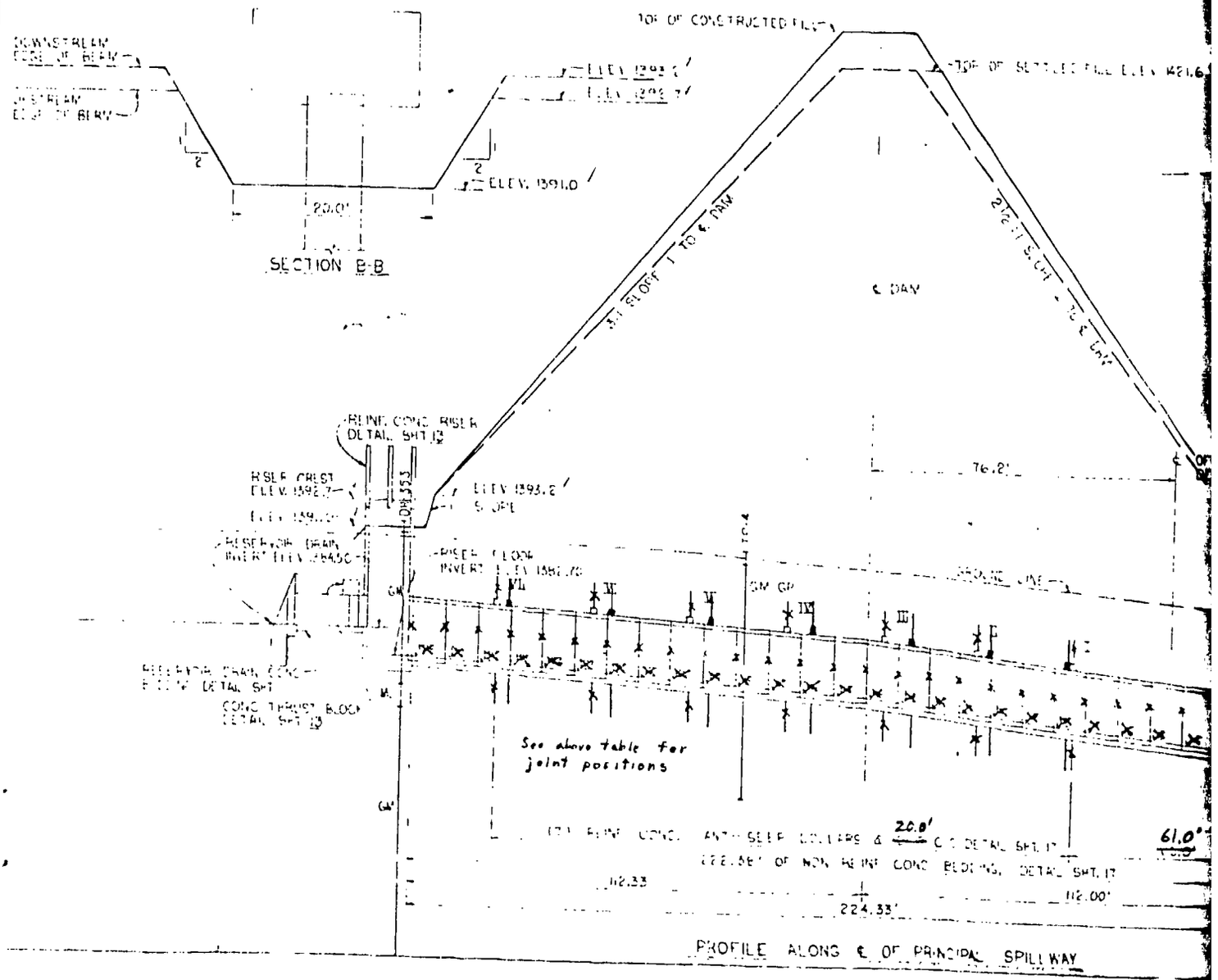
CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLECOWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
FILL PLACEMENT & PRIN SPWY EXCAVATION
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

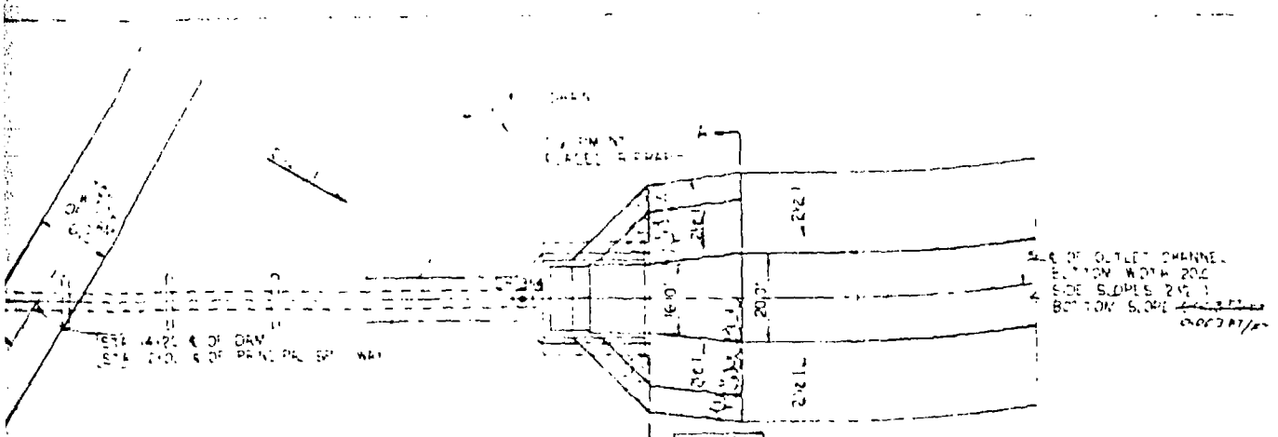
DESIGNED	J POLULECH	2/70
DRAWN	D BURDICK	2/70
TRACED		
CHKD		

NY-216-E

B-13


PLAN VIEW
SCALE IN FEET

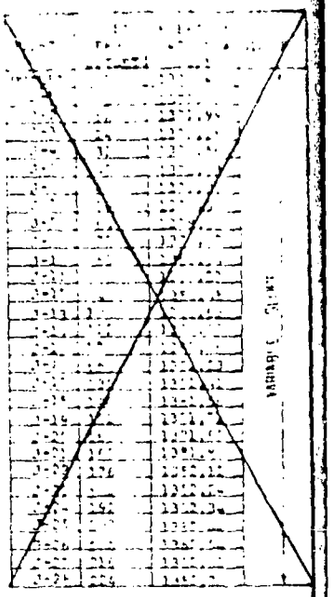

SECTION B-B
ELEV. 1391.0
20.0'
3:1 SLOPE
2:1 SLOPE
76.2'
See above table for joint positions
224.33'
112.00'
PROFILE ALONG ℄ OF PRINCIPAL SPILLWAY



Collar	Dist. from outlet	Invert 42" dia. pipe
Outlet	0	1377.40
I	61	1379.50
II	81	1380.08
III	101	1380.66
IV	126	1381.19
V	151	1381.69
VI	176	1382.12
VII	201	1382.45

Engr. Field Book I
Pages
17-18-19

ENGINEER FIELD BOOK I
AS BUILT
PAGES 16-17



ABOVE DIMENSIONS FOR LENGTH OF PIPE ARE BASED ON NOMINAL LENGTH AND DO NOT INCLUDE CREEP.

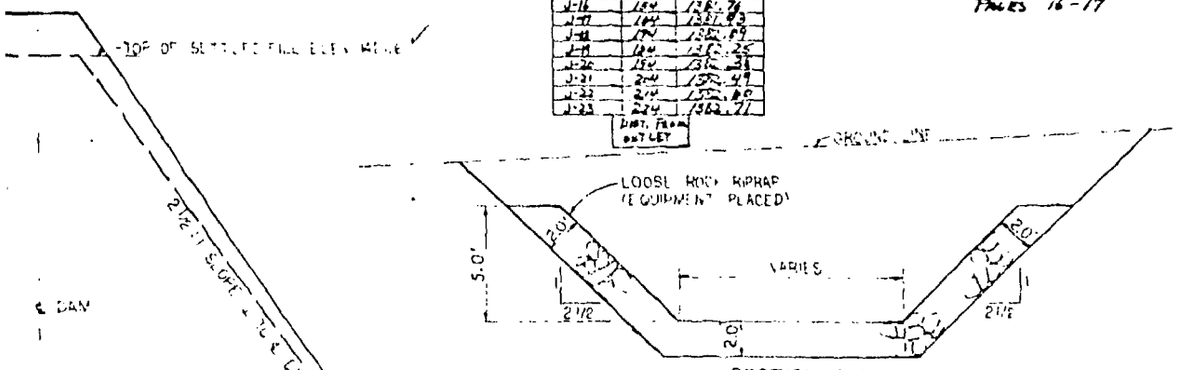
COLLAR	DIST. FROM OUTLET	INVERT 42" DIA. PIPE
I	61	1379.50
II	81	1380.08
III	101	1380.66
IV	126	1381.19
V	151	1381.69
VI	176	1382.12
VII	201	1382.45

42" REINFORCED CONCRETE PIPE
STRENGTH REQUIREMENTS

1. PRESSURE HEAD 32 FT.
2. LOAD 34,675 LBS. PER LIN. FT. BASED ON O.D. OF 4.00 FT.
3. MIN 3 EDGE BEARING STRENGTH FOR 0.01" CRACK 12,990 LBS. PER LIN. FT. FOR PRESTRESSED PIPE (AWWA - C-301)

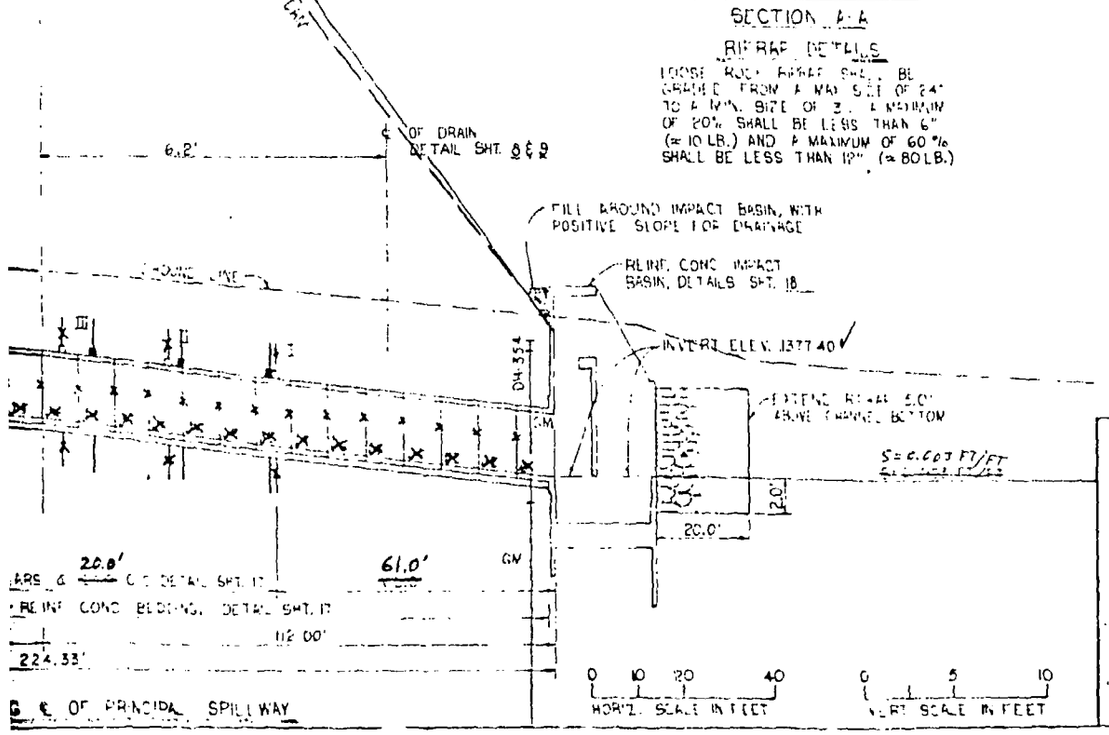
WHERE THE PIPE FURNISHED HAS AN OUTSIDE DIAMETER GREATER THAN THAT CALLED FOR ON THE PLANS, THE THREE EDGE BEARING STRENGTH OF THE PIPE FURNISHED MUST BE EQUAL TO OR GREATER THAN THE SPECIFIED THREE EDGE BEARING STRENGTH MULTIPLIED BY THE RATIO OF THE OUTSIDE DIAMETER OF THE PIPE FURNISHED TO THE OUTSIDE DIAMETER SPECIFIED

FABRICATION INSTRUCTIONS
(2) 8.0° SECTIONS ONE (1) SPIGOT RING WALL FITTING FOR 12" WALL
PIPE SUPPLIERS NOTE
CAST OUTSIDE OF SPIGOT RING WITH CONCRETE ON ONE (1) SECTION



RIPRAP DETAILS

LOOSE ROCK RIPRAP SHALL BE GRADED FROM A MAX. SIZE OF 24" TO A MIN. SIZE OF 3". A MINIMUM OF 20% SHALL BE LESS THAN 6" (≈ 10 LB.) AND A MAXIMUM OF 60% SHALL BE LESS THAN 12" (≈ 80 LB.)



AS BUILT
10/30/72

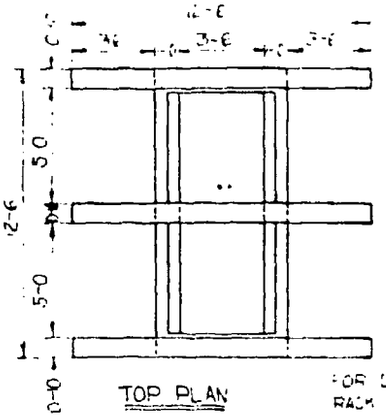
CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
PLAN PROFILE OF PRINCIPAL SPILLWAY
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date
J E POLULECH	2/70
D ANGELO	2/70
M N	3/70
J E POLULECH	2/70

12
23
NY-216B-P

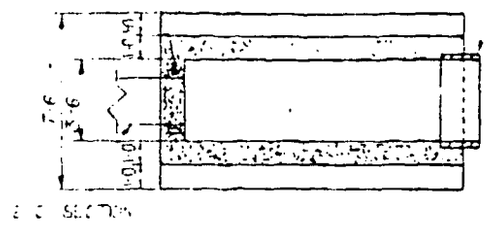
B-14

1 2

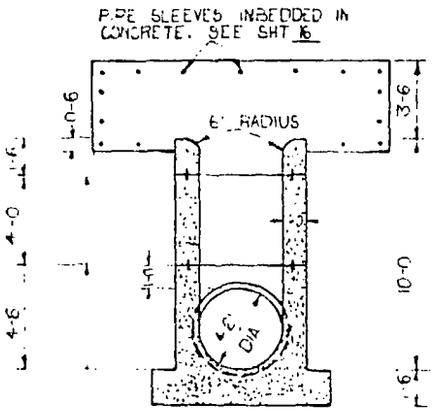


TOP PLAN

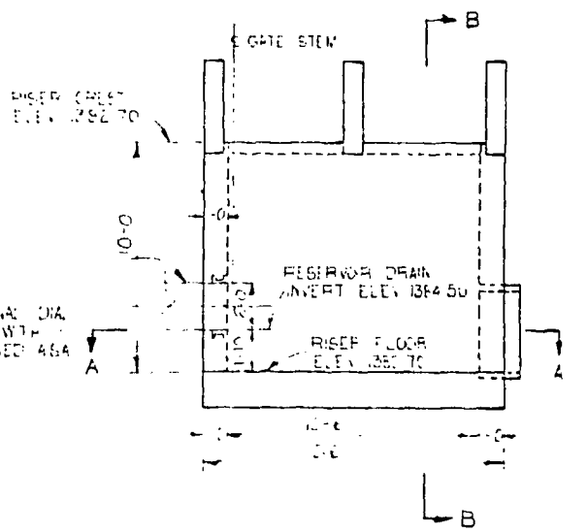
FOR DETAIL OF TRASH RACK ANGLES SEE SHT 16



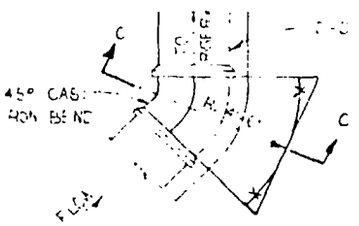
SECTION A-A



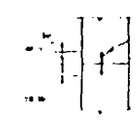
SECTION B-B



SIDEWALL ELEVATION



PLAN VIEW



SECTION C-C

THRUST BLOCK DETAILS

MARK	SIZE
B1	6
B2	6
B3	7
B4	6
B5	6
B6	6
B7	6
B8	6
B9	6
B10	6
B	6
B2	6
B3	6
B4	6
B15	6
B16	6
B17	6
B18	6
B19	6

STEEL SCHEDULE

MARK	SIZE	QUANTITY	LENGTH	TYPE	B	C	TOTAL LENGTH
B	16	5	7-0	1	-	-	91-0
B2	6	6	12-0	1	-	-	36-0
B3	7	44	9	21	3-8	7-6	401-4
B4	6	8	12-0	1	-	-	96-0
B5	6	12	2-0	1	-	-	24-0
B6	6	2	2-10	1	-	-	5-8
B7	6	4	8-5	21	-0	7-5	33-8
B8	6	4	8-5	21	1-0	7-5	33-8
B9	6	4	8-5	21	1-0	7-5	37-10
B10	6	2	8-5	21	1-0	7-5	18-10
B	6	4	11-2	1	-	-	56-2
B2	6	4	4-2	1	-	-	16-8
B3	6	20	10-8	21	3-7	7-1	213-4
B4	6	4	8-2	21	1-1	7-1	32-8
B15	6	8	7-10	21	0-9	7-1	31-4
B16	6	6	7-7	21	0-6	7-1	45-6
B17	6	2	9-2	21	2-1	7-1	18-4
B18	6	2	2-9	1	-	-	5-6
B19	6	2	2-10	1	-	-	5-8

MARK	SIZE	QUANTITY	LENGTH	TYPE	B	C	TOTAL LENGTH

CONSTRUCTION DETAILS

1 SPECIFIED BAR DIMENSIONS ARE MEASURED TO OUTSIDE EDGE
2 RADIUS OF BENDS EQUALS 3 BAR DIAMETERS FOR SIZES EQUAL
3 THE 2" AND 3" DISTANCE FROM SPECIFIED CONCRETE SURFACES
NOT OTHERWISE SPECIFIED ALL REINFORCING STEEL PLACED IN
GROUND SHALL HAVE A MINIMUM OF 3" COVER ALL REINFORC
POURED IN FORMS SHALL HAVE A MINIMUM OF 2" CLEAR COVE
4 ALL EXPOSED EDGES OF CONCRETE TO HAVE A 3/4" CHAMFER

OF ALL BENDS
TO OR LESS THAN 7
ES ARE CLEAR DISTANCES WHERE
CONCRETE POURED AGAINST THE
ING STEEL PLACED IN CONCRETE
ER
UNLESS OTHERWISE NOTED

SLIDE GATE DETAILS

1 24" DIAMETER FLAT FRAME SLIDE GATE (SELF CONTAINED UNIT)
2 CLASS O-10
3. SLIDE GATE SHALL CONFORM TO SPEC 301 AND SHALL BE T
4 'C' TYPE WALL THIMBLE 8' DEEP
5 STEM SHALL BE SIZED ACCORDING TO MANUFACTURER'S RECOMM
EQUIPPED WITH A REMOVEABLE T-HANDLE WRENCH THE WRE
4" ABOVE THE TOP STEM GUIDE AND 13'-0" ABOVE THE FLOOR
STEM GUIDES WILL BE LOCATED ACCORDING TO MANUFACTURE

TYPE MHS-1

MENDATIONS STEM SHALL BE
NCH SOCKET SHALL BE LOCATED
OF THE RISER (13') ALL OTHER
RE RECOMMENDATIONS

6. HOLES DRILLED IN BACK FLANGE OF WALL THIMBLE BY GATE
ASA CLASS 125 FLANGE SPECIFICATIONS
DIAMETER OF BOLT CIRCLE- 29 1/2"
NO OF BOLT HOLES - 20
DIAMETER OF BOLT HOLES - 1 3/8"

E MANUFACTURER ACCORDING TO

[illegible] PIPE ADAPTER
CAST IRON PIPE FLANGE
ADJUSTABLE

DETAIL 3
NOT TO SCALE

10/30/72

QUANTITIES

STEEL #5 BARS 350 @ 3.4 LBS
#6 BARS 2250 @ 3.4 LBS
#7 BARS 4914 @ 3.4 LBS
4750 LBS

REINF CONCRETE 2.4 CU YDS.
NON-REINF CONC 1.0 CU YDS

CONEWANGO CR
FLOOD
CATTARA
RISER ST
U.S. DEPART
SOIL CONS
J POLULECH
D BURDICK
M N

CREEK WATERSHED PROJECT
SITE 16A
WATER RETARDING DAM
ANGUS COUNTY, NEW YORK
STRUCTURAL DETAILS
MENT OF AGRICULTURE
SERVATION SERVICE
11/69
11/69
[illegible] NY [illegible]

B-15

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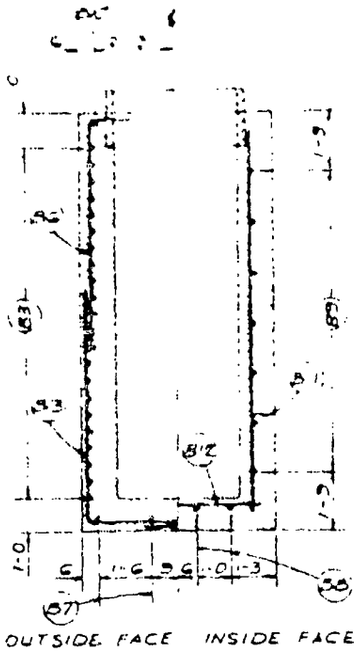
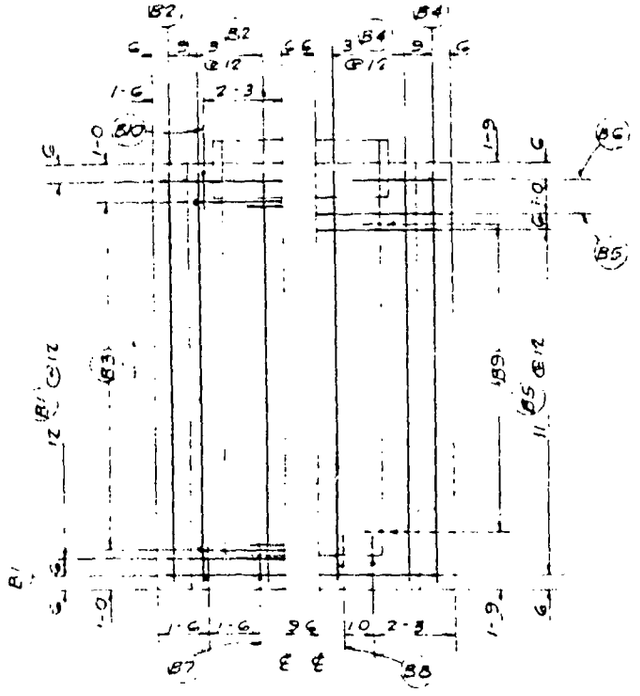
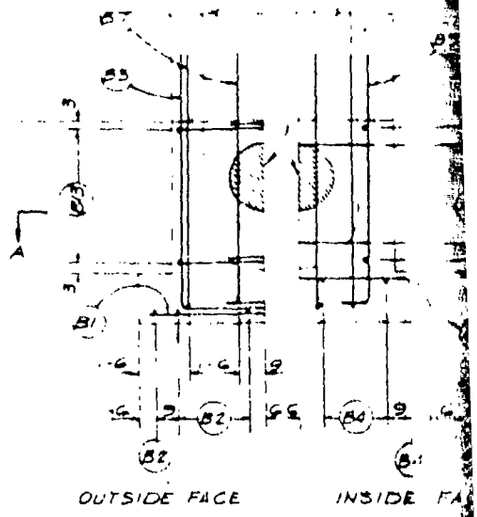


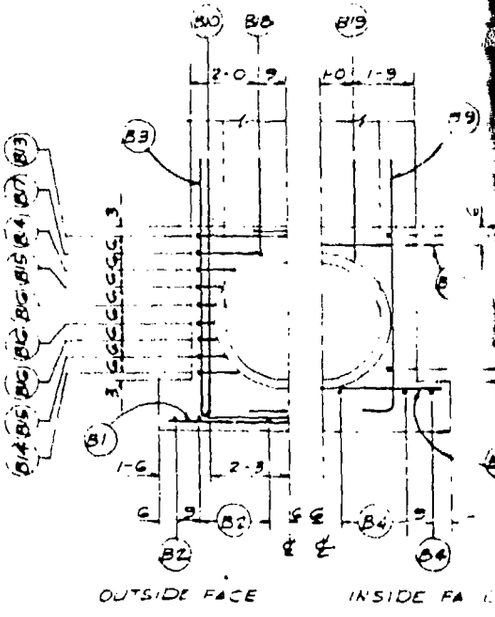
SECTION A-A



FOOTING PLAN

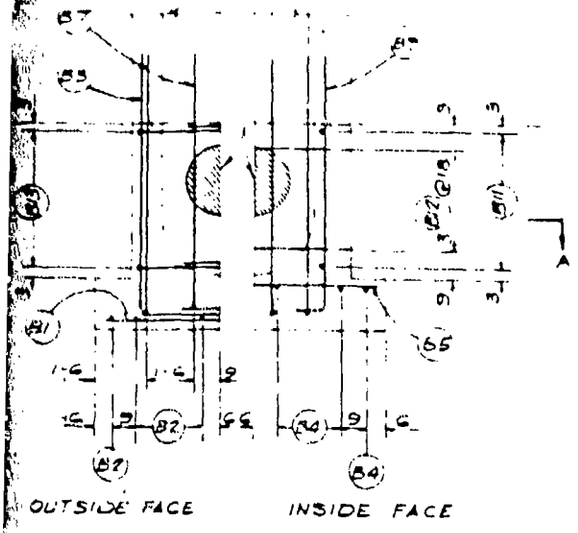


UPSTREAM ELEVATION

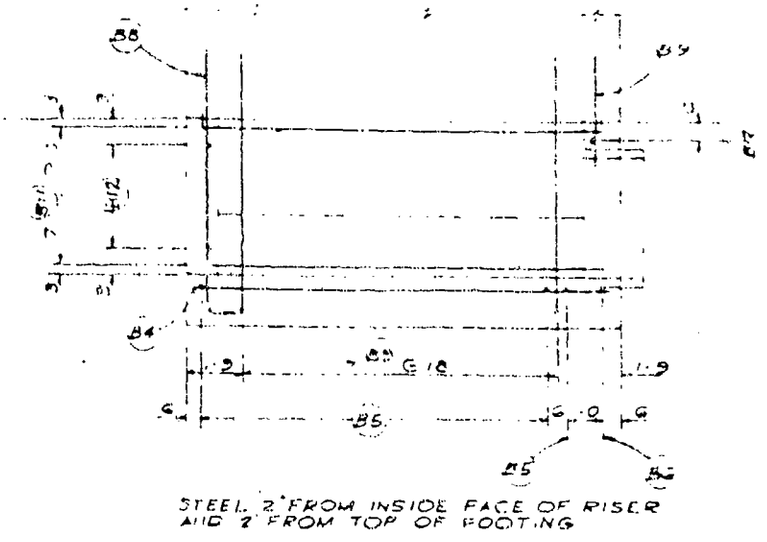


DOWNSTREAM ELEVATION

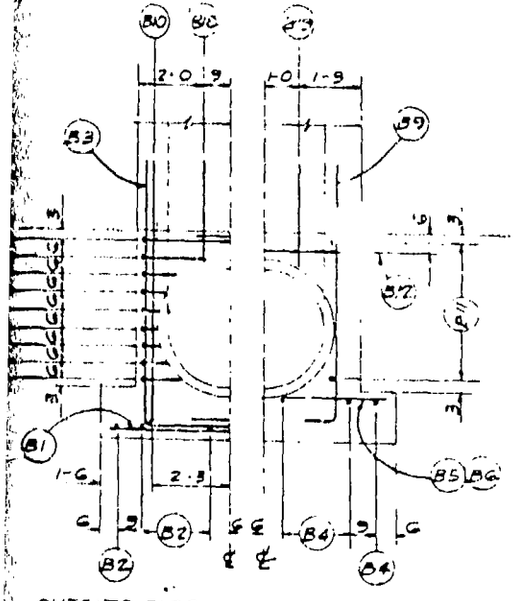
0 2 4 6
SCALE IN FEET



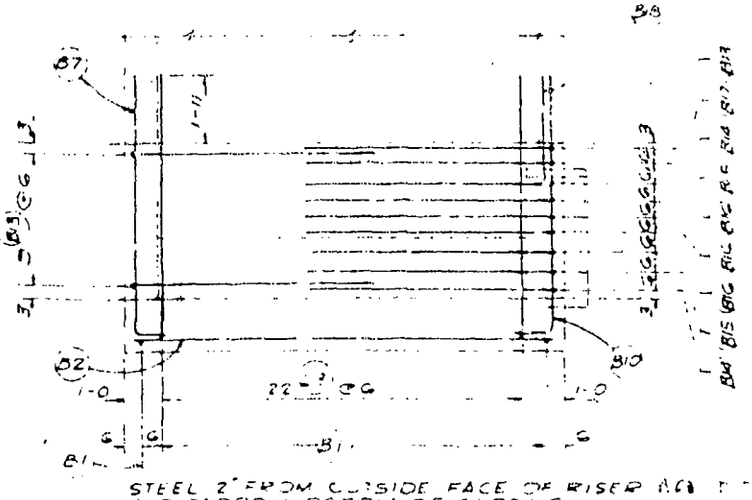
UPSTREAM ELEVATION



SIDEWALL ELEVATION



DOWNSTREAM ELEVATION

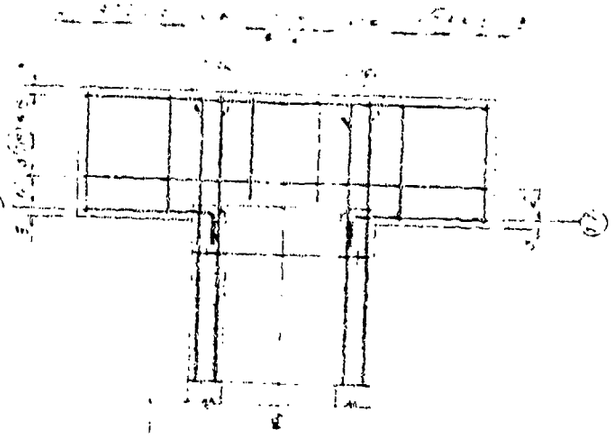


SIDEWALL ELEVATION

12/30/72

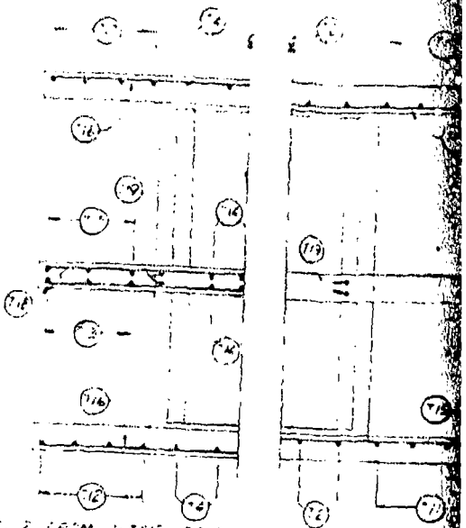
CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
RISER STRUCTURAL DETAILS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

B-16



SECTION E-B

RISER SIDEWALL STEEL NOT SHOWN

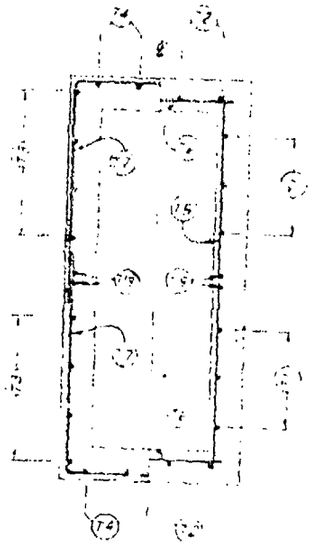


STEEL 2 FROM OUTSIDE FACE

STEEL 2 FROM

PLAN - ANTI-VORTEX WALLS

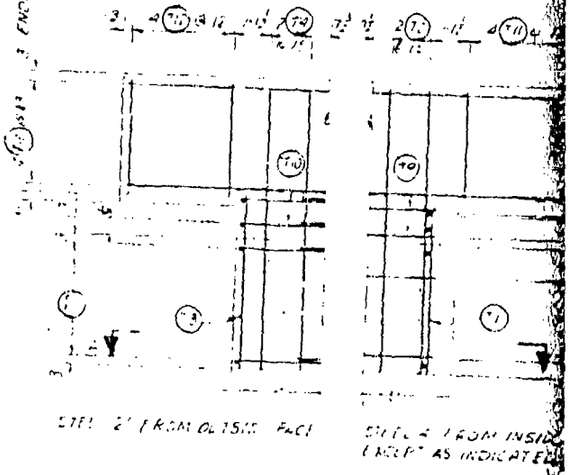
RISER SIDEWALL STEEL NOT SHOWN



INSIDE STEEL

INSIDE STEEL

SECTION A-A

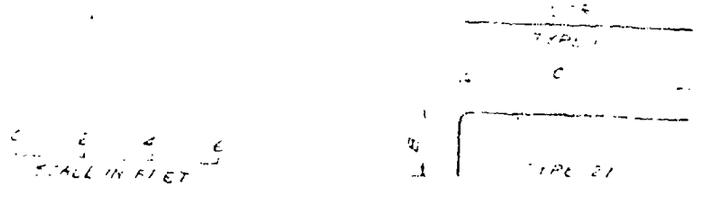


STEEL 2 FROM OUTSIDE FACE

STEEL 2 FROM INSIDE

EXCEPT AS INDICATED

END A - ELEVATION

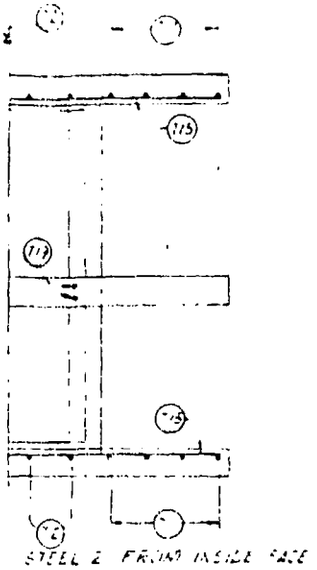


SCALE IN FEET

TYPE 1

C

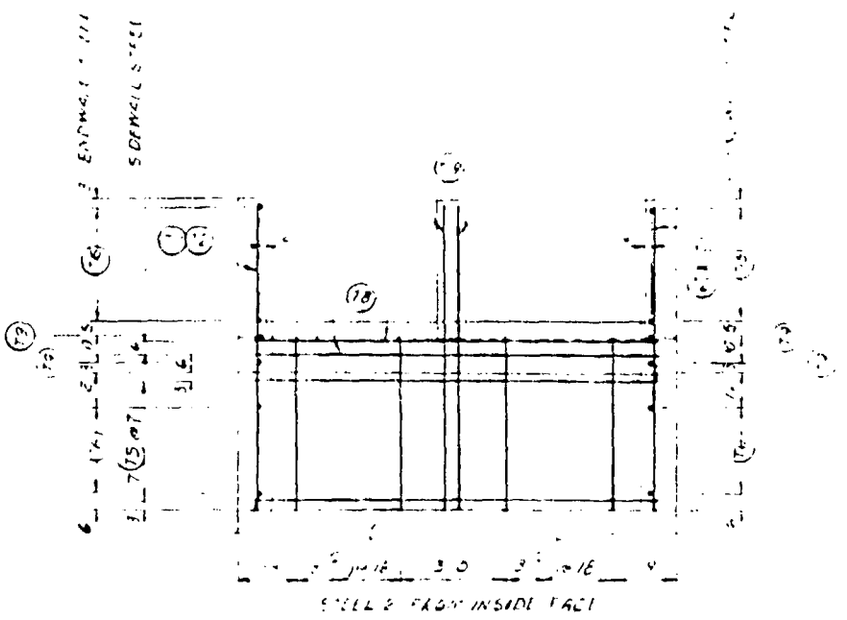
TYPE 21



STEEL 2 FROM INSIDE FACE

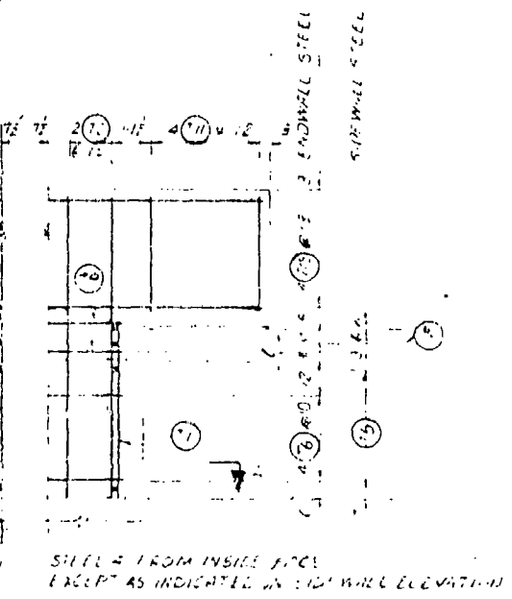
1 - VORTEX WALLS

L STEEL NOT SHOWN



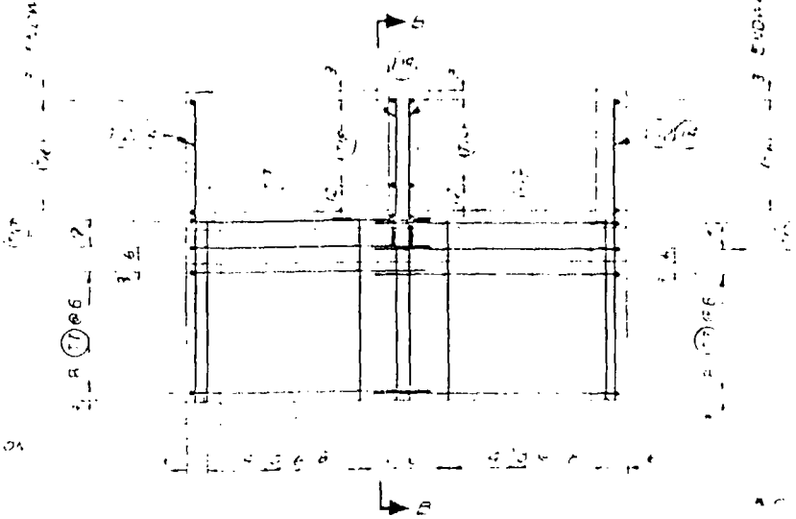
STEEL 2 FROM INSIDE FACE

SIDEWALL ELEVATION



STEEL 4 FROM INSIDE FACE
EXCEPT AS INDICATED IN SIDEWALL ELEVATION

ELEVATION



STEEL 2 FROM OUTSIDE FACE

SIDEWALL ELEVATION

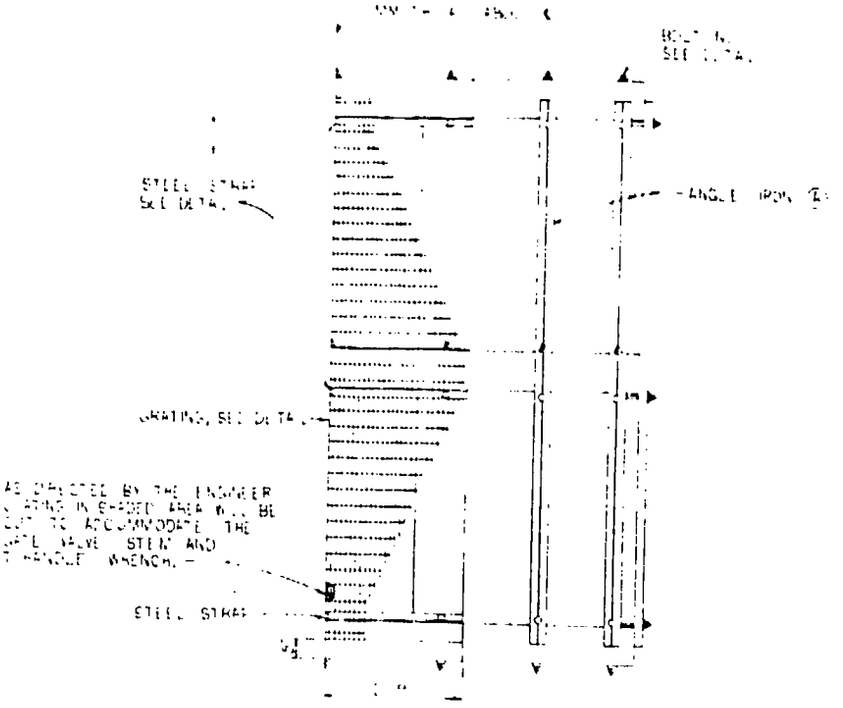
10/30/72

CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
RISER STRUCTURAL DETAILS

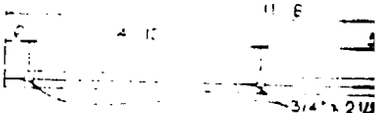
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

E. POLLECH 10-69

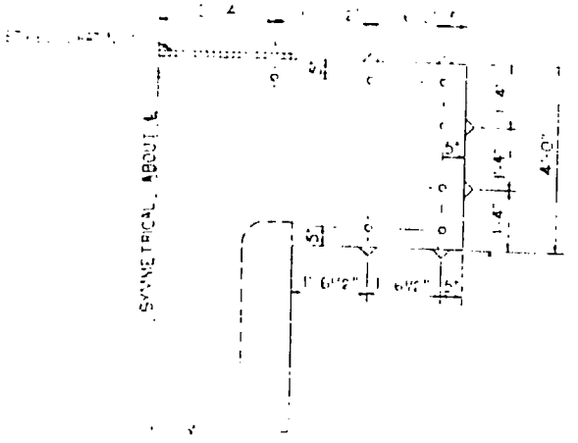
B-17



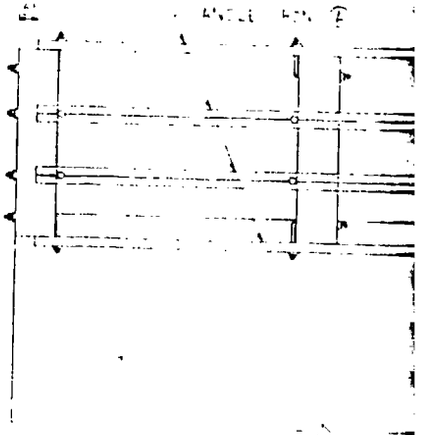
PLAN



ANGLE IRON (A)



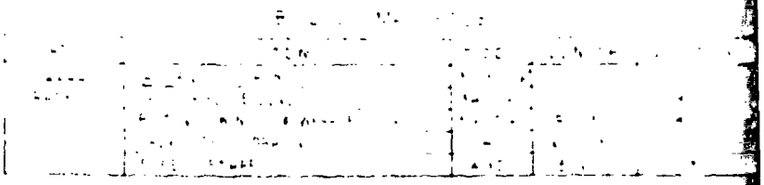
UPSTREAM ELEVATION



SIDE ELEVATION

RISER TRASH RACK DETAILS

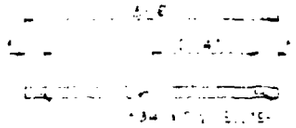
SCALE IN FEET



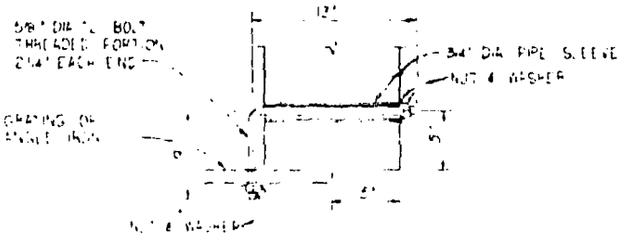
CONSTRUCTION DETAILS

MATERIAL IN THE BASE TRASH RACK AND CONCRETE TO SPEC. FOR CONC. FOR CARBON STEEL PLATES SHAPES AND BARS.

ENTIRE TRASH RACK TO BE [illegible] ACCORDANCE WITH SPEC. SEC.

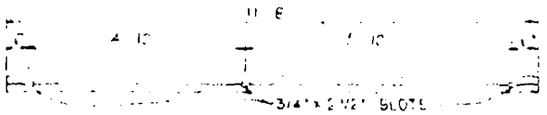


STEEL STRAP DETAIL

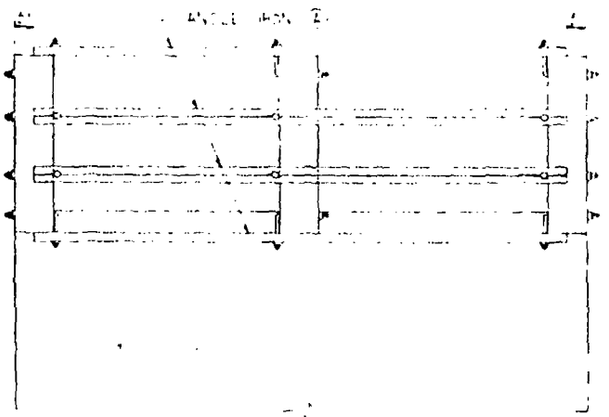


BOLT DETAIL NO. 1

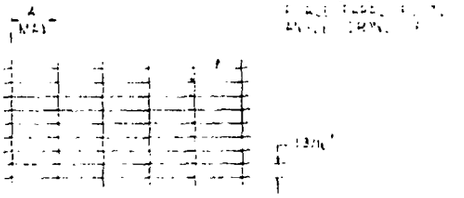
GALV IRON, SUPPLY W/ TYPE 1 NUTS & WASHERS



ANGLE IRON (A)



SIDE ELEVATION



GALVANIZED STEEL GRATING DETAIL

10/30/72

RISER TRASH RACK DETAILS

0 1 2 4

SCALE IN FEET

CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
RISER TRASH RACK
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

J. E. POLULECH	2/70	
D. ANGELO	2/70	
U. E. F.	2-70	16 / 23 NY-2168-P

B-18

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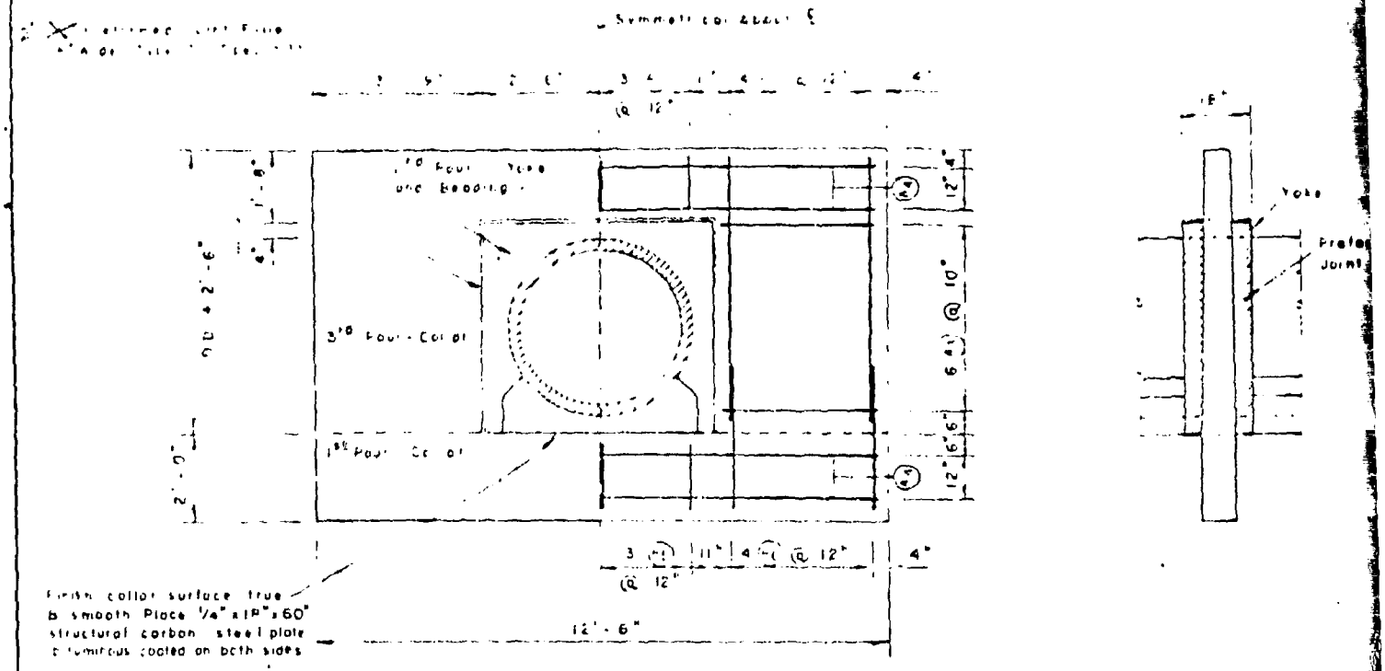
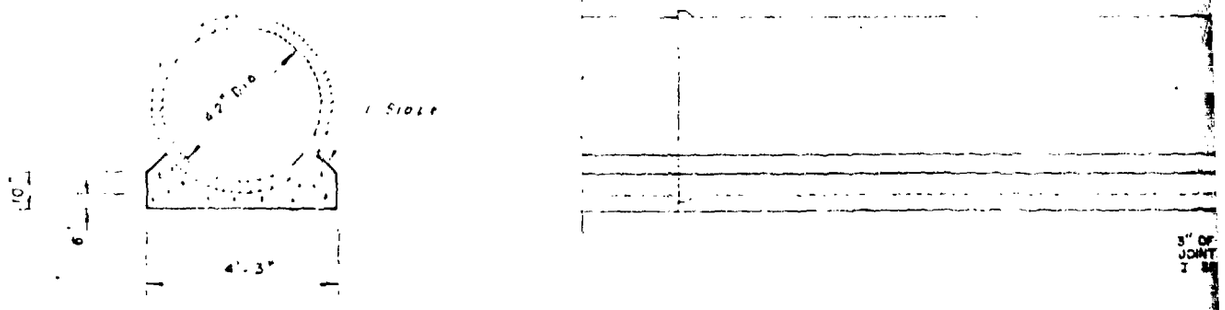
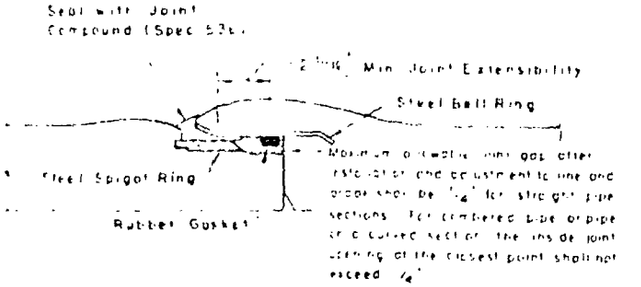


REINFORCED CONCRETE ANTI - SEEP COLLAR

7 - Req'd



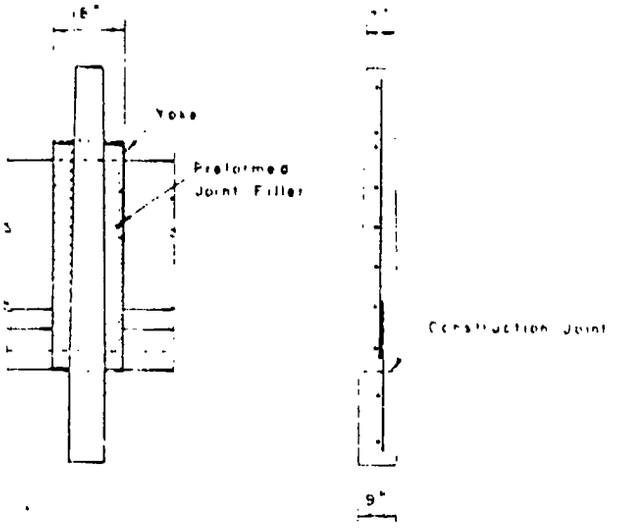
CONCRETE BEDDING



REINFORCED CONCRETE PIPE - JOINT DETAILS

RESERVOIR DRAIN CONCRETE BEDDING

BAR TYPE



ANTI-SEEP COLLAR STEEL SCHEDULE

Mark	Size	Length	Type	Size	Bend	Total Length	Weight
A-1	4	3'					
A-2	4	6' 3"		6		56'	94 lbs
A-3	4	3' 9"		7		84'	273 lbs
A-4	4	12' 0"		4		48'	156 lbs
A-5	4	8'		5		38'	82 lbs
A-6	4	3' 6"		8		56'	210 lbs

NOTE:
Bar lengths do not change with changes in outside diameter of pipe

QUANTITIES (This Sheet Only)

STEEL

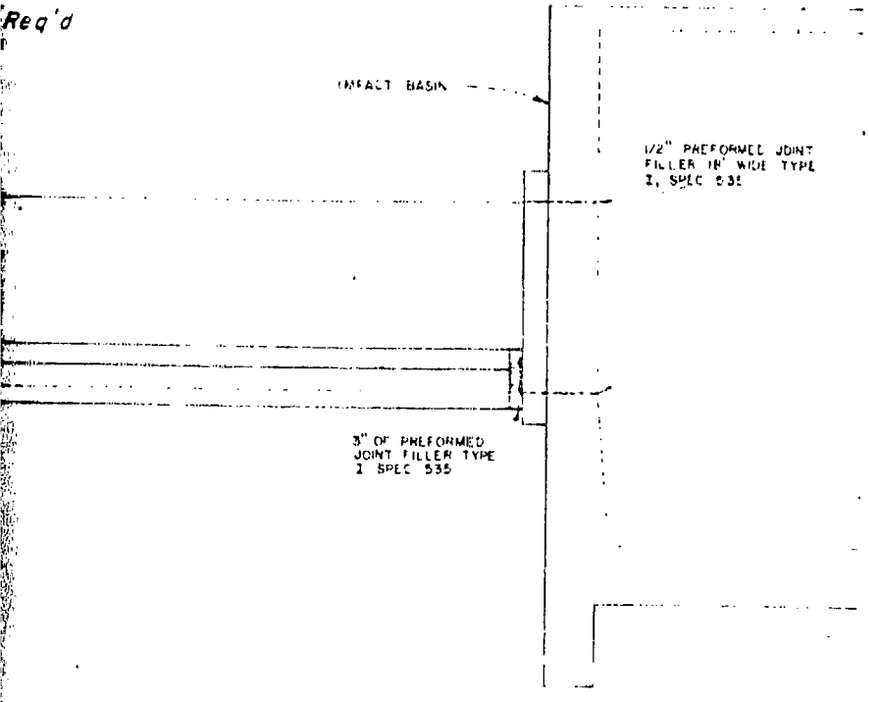
No. 4 bar 1265-3 lbs 845 lbs

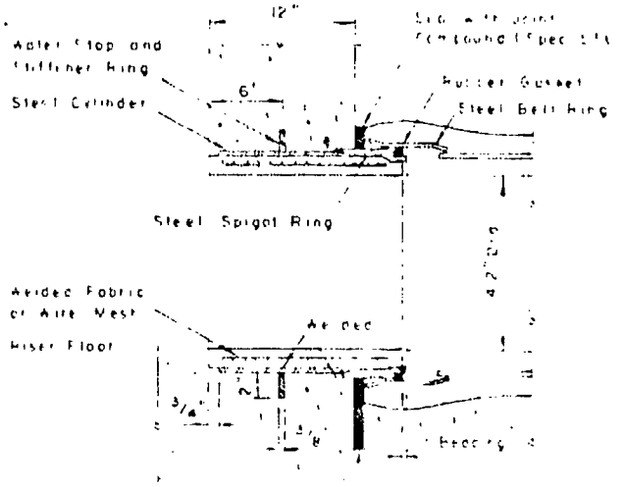
CONCRETE

REINFORCED 14.6 Cu yds
NON-REINFORCED 34.6 Cu yds

LLAR

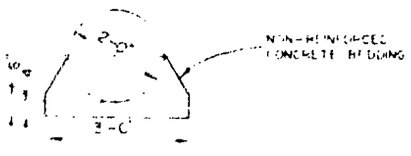
Req'd





1/2" Preformed Joint Filler, Type 2 (Spec 535) Placed between riser and bedding

SPIGOT WALL FITTING 10/30/78



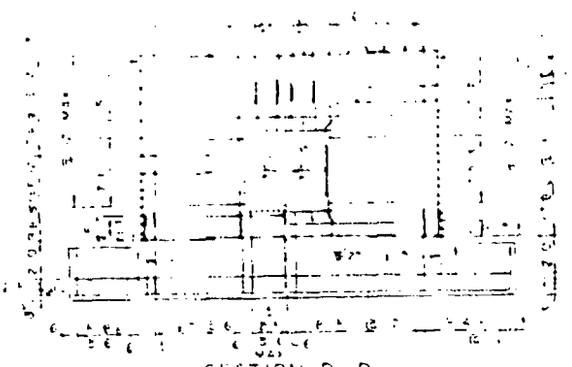
RESERVOIR DRAIN CONCRETE BEDDING

CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
CONDUIT DETAILS

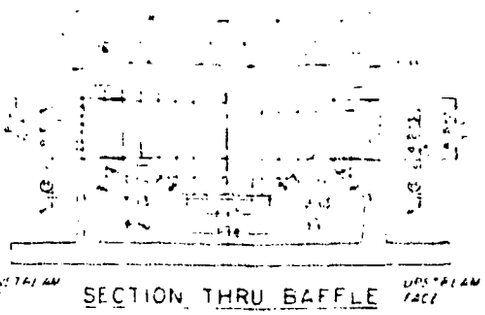
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Drawn: J.E. POLULECH Date: 2/70

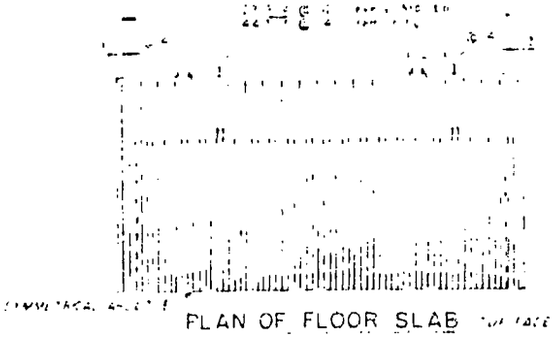
NY-216B-E



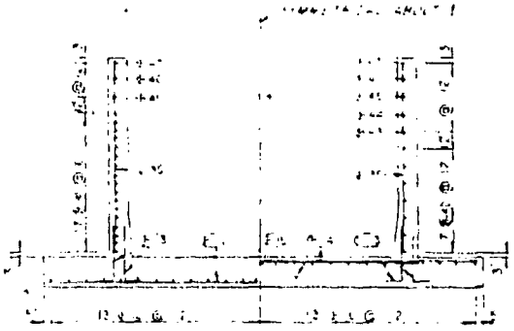
SECTION D - D



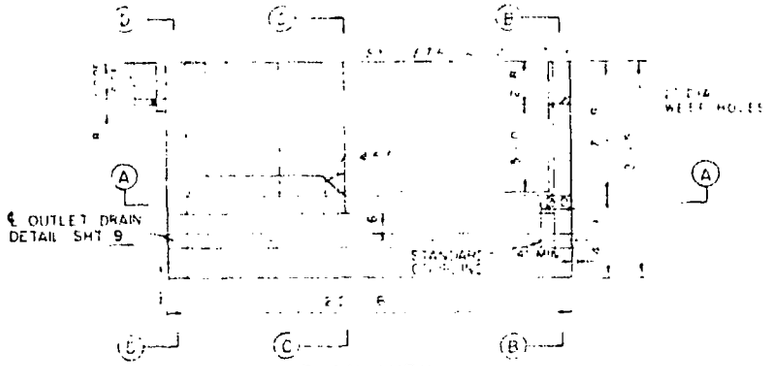
SECTION THRU BAFFLE



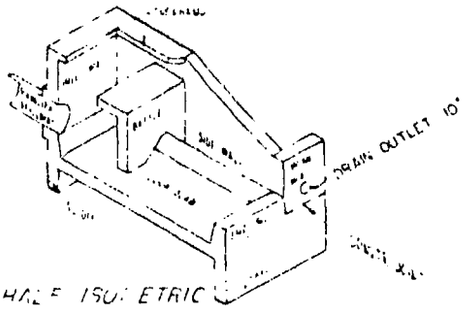
PLAN OF FLOOR SLAB



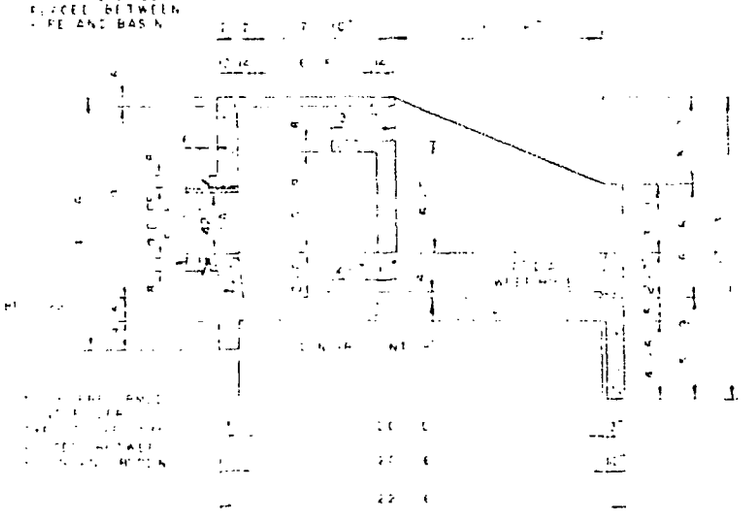
SECTION C - C



PLAN VIEW



HALF ISOMETRIC



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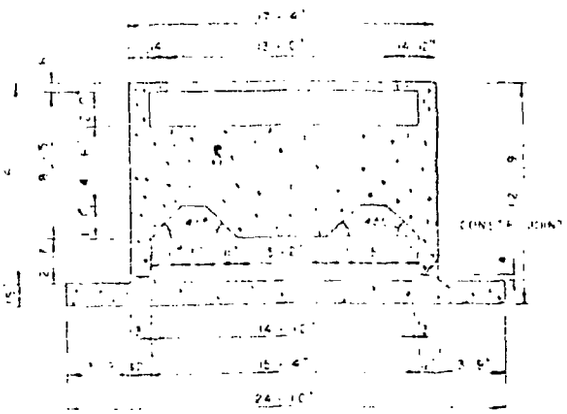
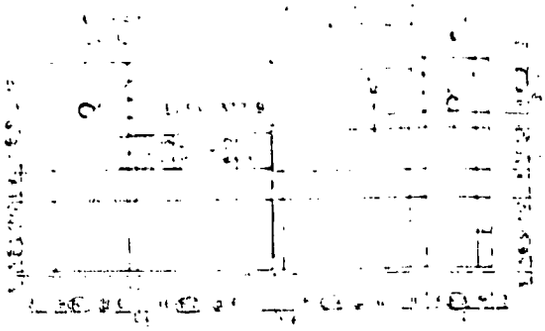
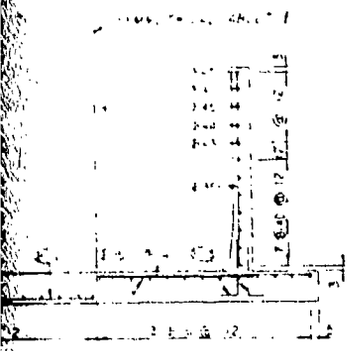


SECTION THRU BAFFLE

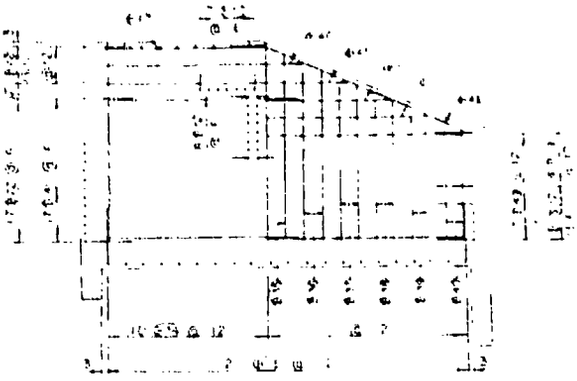
ON THRU BAFFLE



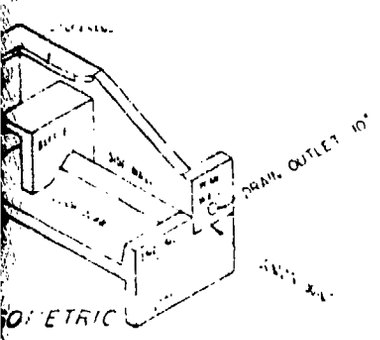
SECTION B-B



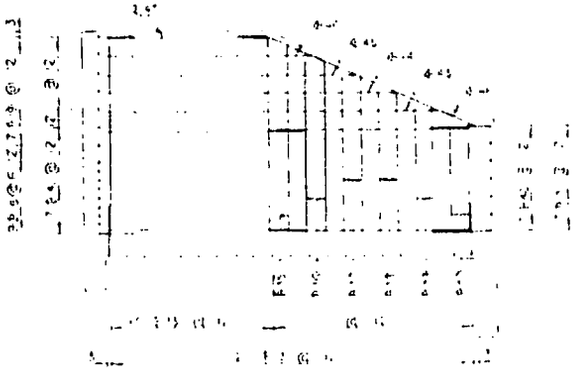
SECTION C-C



SECTION A-A

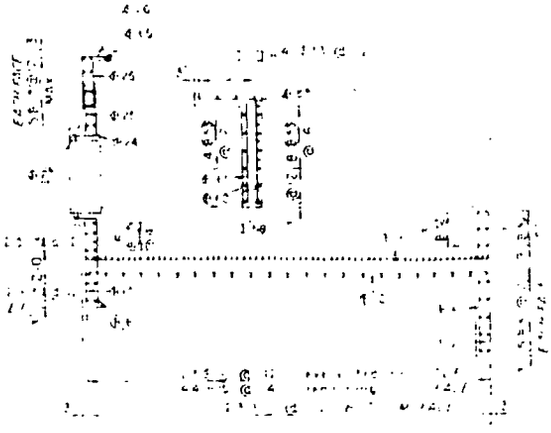


OMETRIC

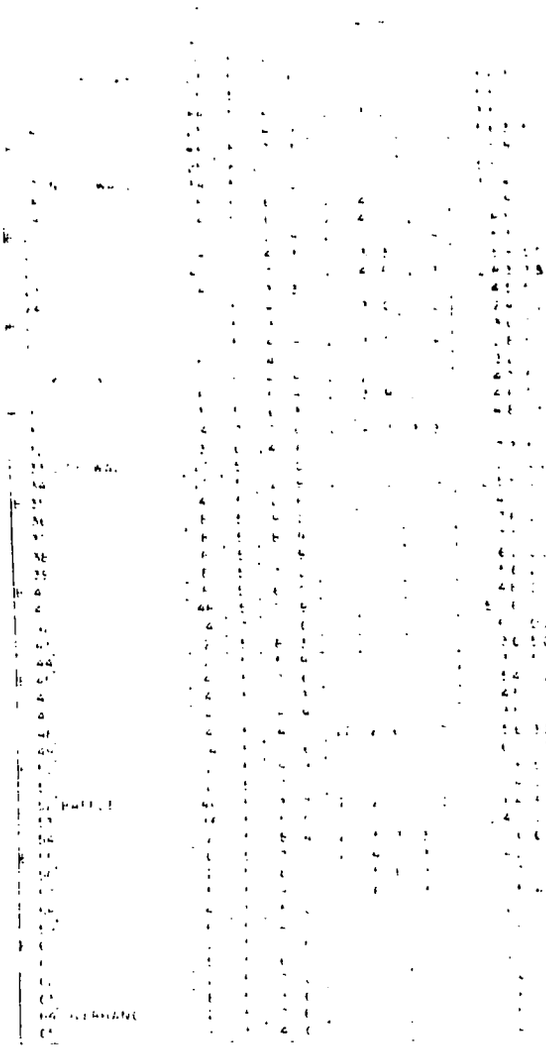


SECTION A-A

TION THRU BAFFLE



SECTION ON ℄



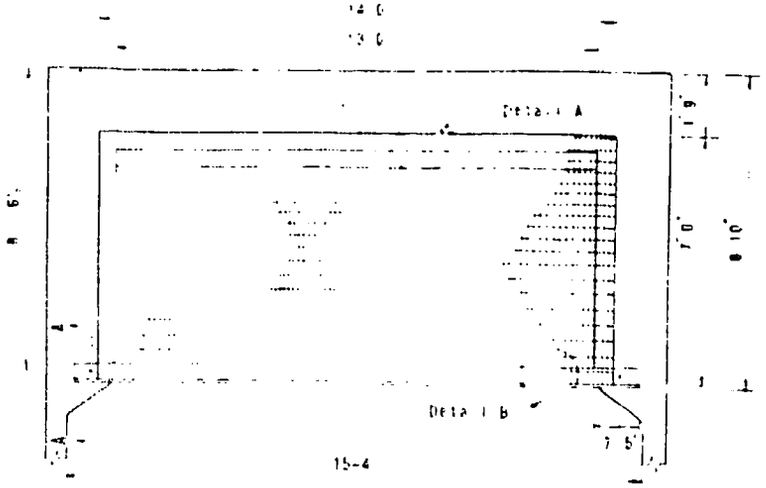
QUANTITIES

REINFORCED

10/30/72

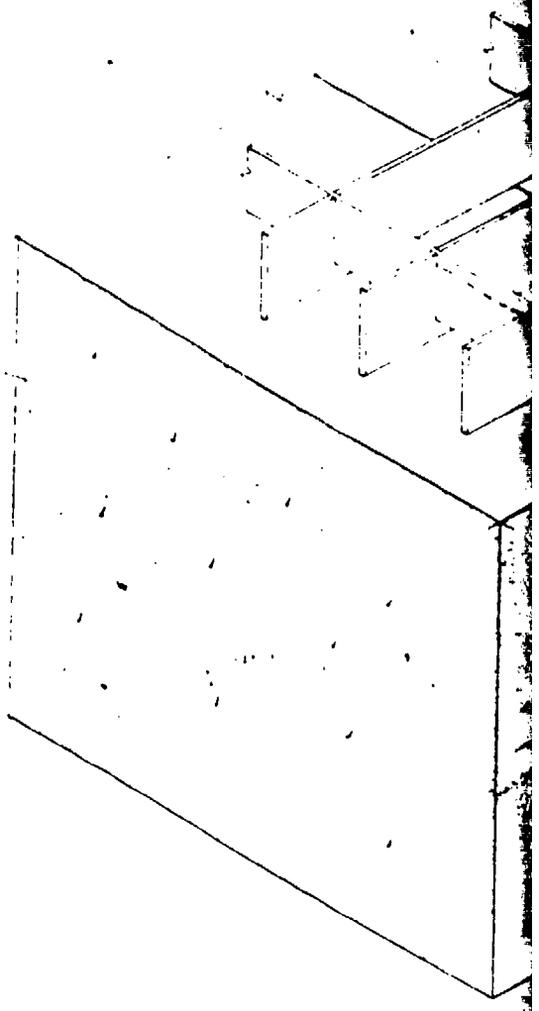
CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLOOD WATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
IMPACT BASIN DETAILS

B-20

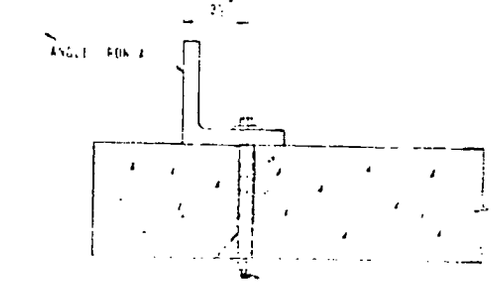


PLAN VIEW

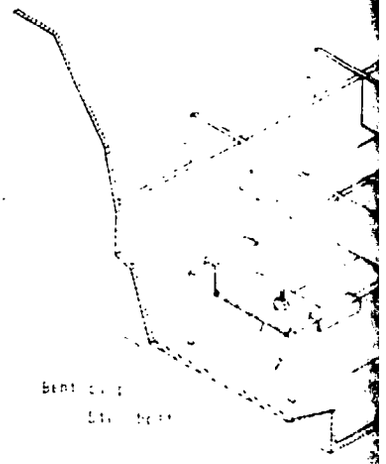
Scale in feet



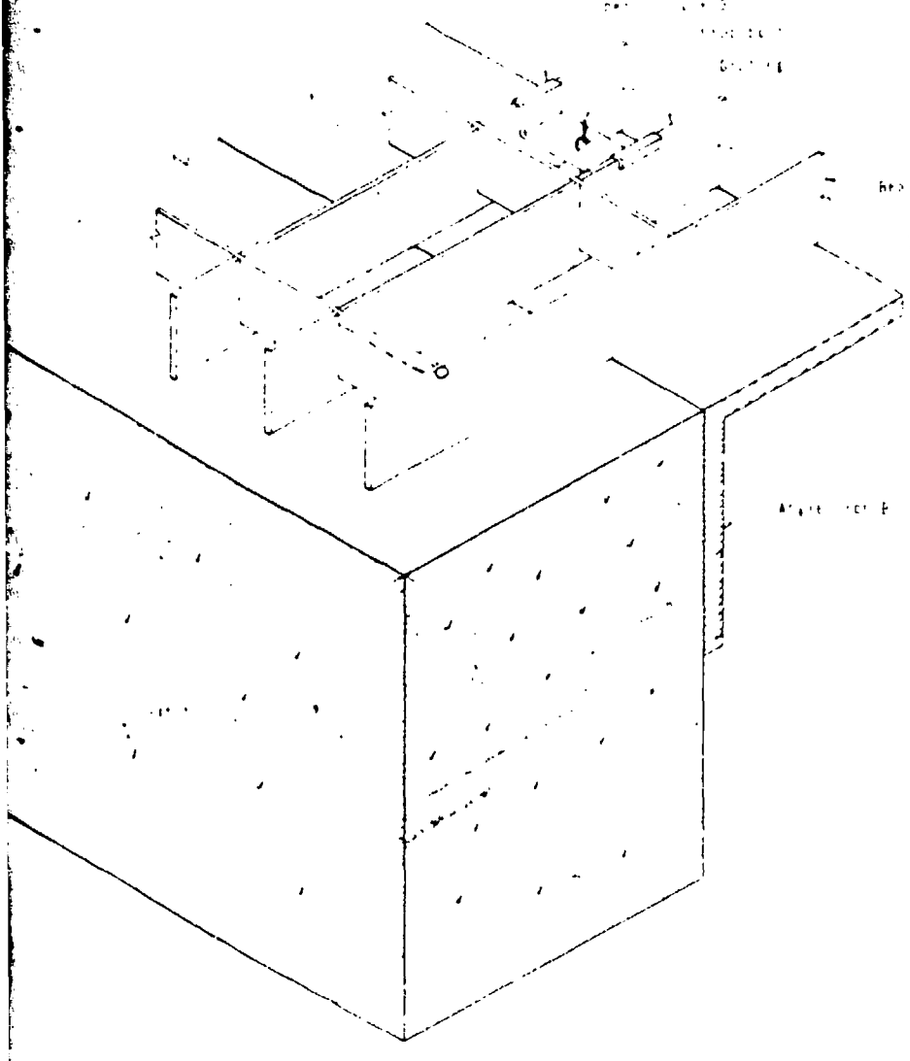
DETAIL A



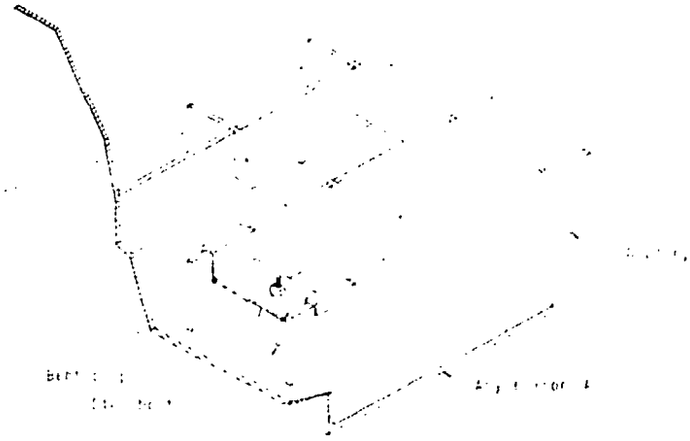
SECTION A-A



DETAIL B



DETAIL A



DETAIL B

AS BUILT
10/30/72

CONTRACT MODIFICATION #2

LITTLE WANGO CREEK WATERSHED
S.T.F. 16A
FLOODWATER RETARDING DAM
EMERGENCY SPILLWAY
REACT GAS N GRATING
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

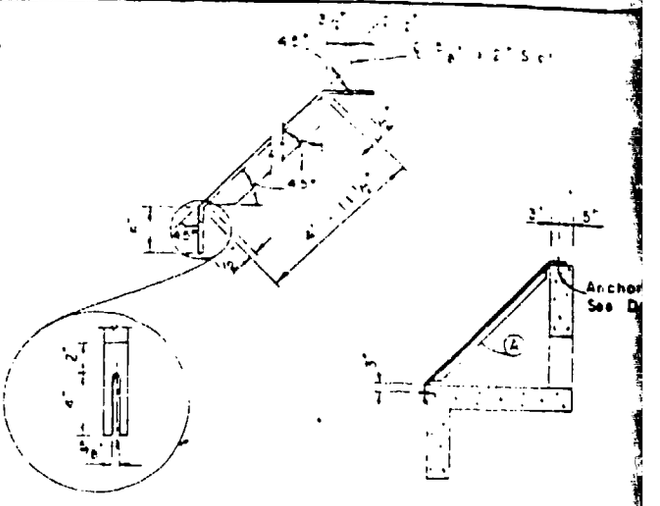
2

RESERVOIR DRAIN TRASH RACK BILL OF MATERIALS

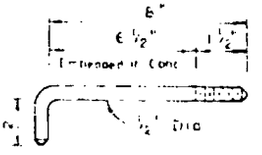
Item	Size	Length	Quan
Anchor Bolt	½" Dia	1'-8"	4

CONSTRUCTION DETAILS

1. Material in reservoir drain trash rack shall conform to Spec 58 for structural steel.
2. Trash rack to be galvanized in accordance with Spec 562.



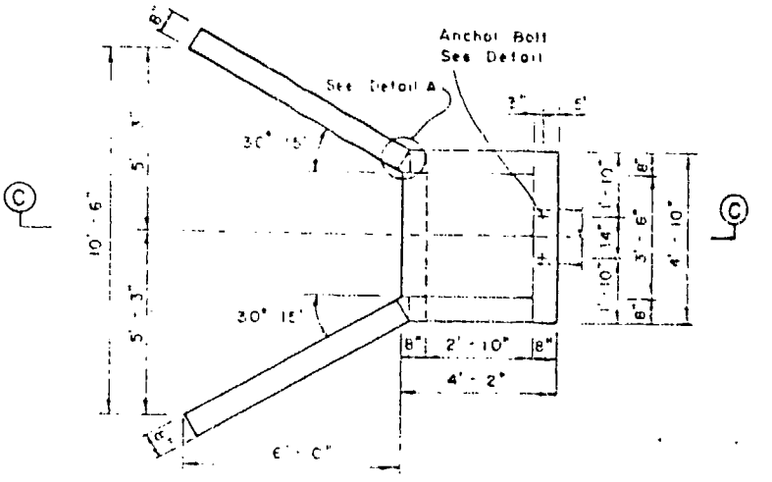
TRASH RACK



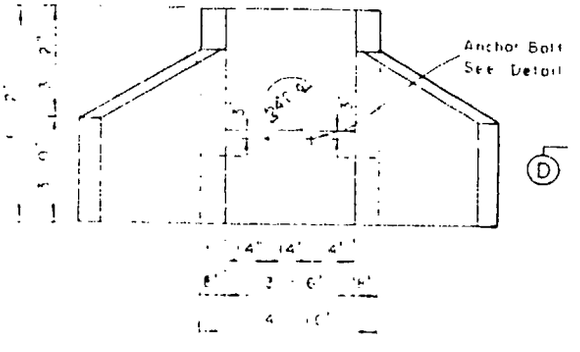
ANCHOR BOLT

Stainless Steel (Class 302, 303 Se or 304, Condition A)

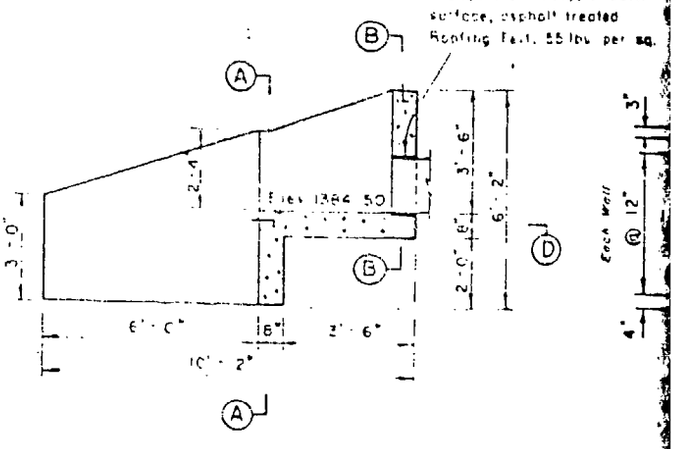
Supply with washers and Type 2 nuts



PLAN



UPSTREAM ELEVATION



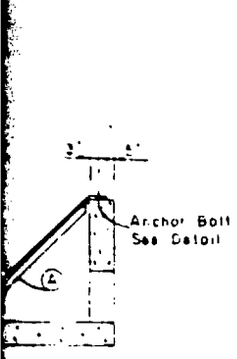
SECTION ALONG CENTERLINE

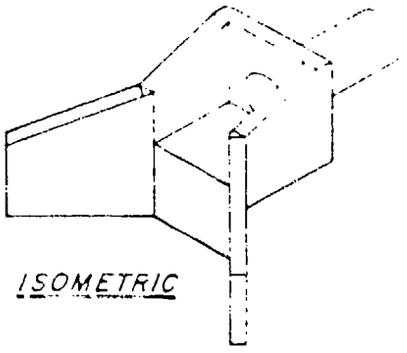
REINF. CONCRETE RESERVOIR D

BAR TYPES

RESERVOIR DRAIN STEEL SCHEDULE

Mark	Quan	Size	Length	Type	B	C	Total Length
	5	4	5' 9"	2	1' 3"	3"	
	4	4	5' 9"	2	5' 0"	3"	
	3	4	8' 0"	2	6' 6"	4' 0"	
	4	4	9' 4"	22	4' 9"	3"	
	2	4	5' 0"	22	2' 3"	3"	
	2	4	2' 1"	2	2' 0"	9"	
	2	4	1' 1"	22	2' 4"	3"	
	4	4	2' 9"	1			
	4	4	3' 3"	1			
	4	4	3' 9"	1			
	2	4	4' 6"	1			
	2	4	5' 3"	2	2' 3"	2' 6"	
	4	4	6' 0"	2	2' 9"	3"	
	4	4	5' 0"	2	2' 9"	3"	
	3	4	3' 6"	1			





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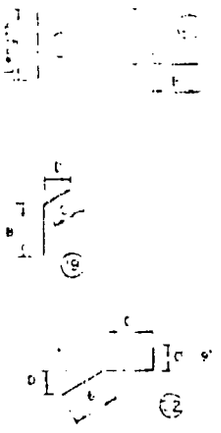
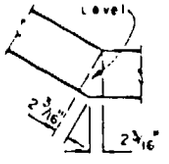




DETAIL A

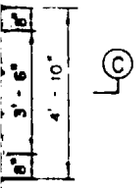
QUANTITIES (This Sheet Only)

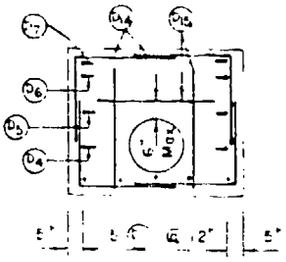
STEEL

No. 4 Bar 2666 * 78 Lbs

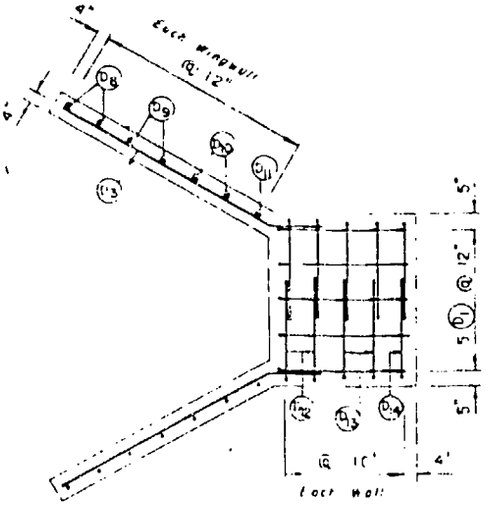
CONCRETE

30 Cu Yds Reinforced



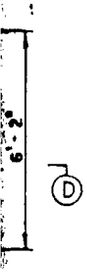


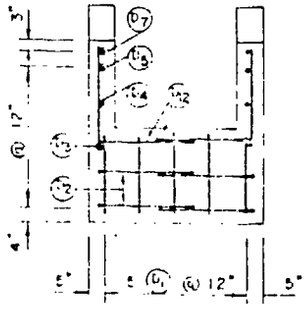
SECTION BB



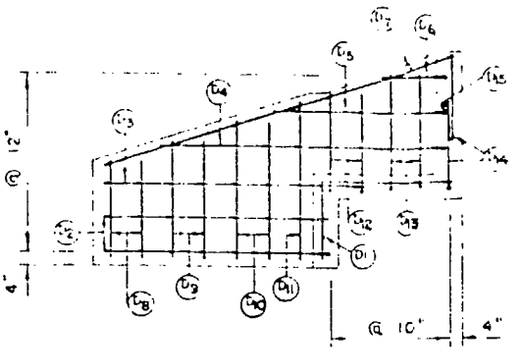
SECTION DD

...s of heavy, smooth
..., asphalt treated
... Felt, 55 lbs. per sq.





SECTION AA



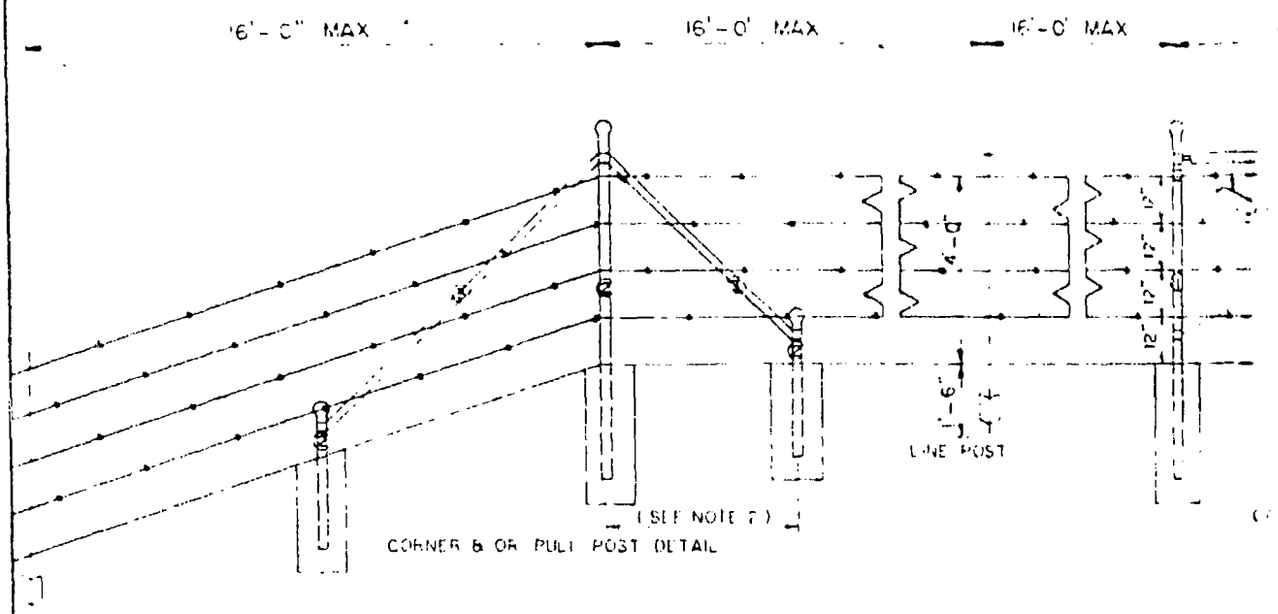
SECTION CC

SERVOIR DRAIN INLET

10/30/72

CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
RESERVOIR DRAIN INLET DETAILS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Approved J. E. POLULECH 2/72



CORNER & OR PULL POST DETAIL

1 FENCING SHALL
SPECIFICATION

2 BRACE POSTS &
MAXIMUM SPACI

3 LINE POSTS SH
SHALL BE OF
PER FT (EXCLU
BE LESS OF

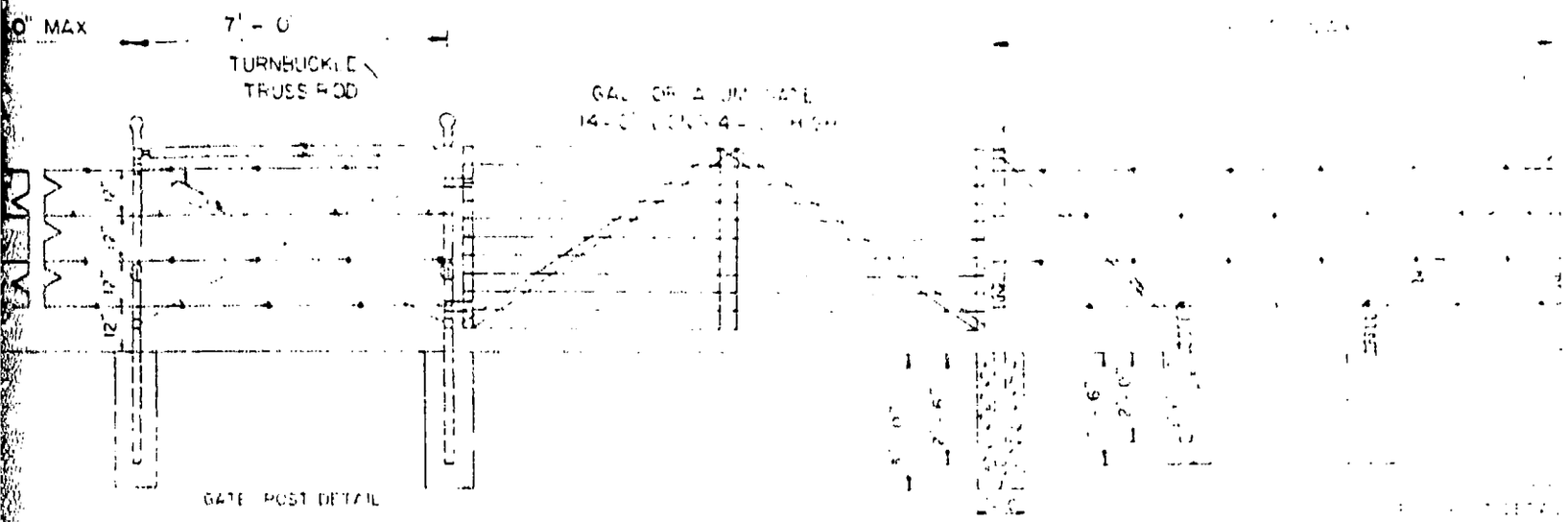
4 THE GALVANIZE
ITEM
1. GATE POST (
2 CORNER POST
3 BRACE PO

ALL FITTINGS AR
AND SHALL BE

5 BARBED WIRE SH
ROUND BARBS

6 THE CONCRETE
5 BAGS (94 LBS
THE SLUMP SHAS
THE TIME BETW
AND THE PLACI

7 ALL POSTS EXC



CONSTRUCTION DETAILS

1. FENCING SHALL BE INSTALLED IN ACCORDANCE WITH CONSTRUCTION SPECIFICATION 92
2. BRACE POSTS SHALL HAVE A MINIMUM SPACING OF 4 - 0" AND A MAXIMUM SPACING OF 7 - 0"
3. LINE POSTS SHALL BE STANDARD GALVANIZED 6'-0" IN LENGTH AND HAVE "H" OR U SHAPES AND HAVE A MINIMUM WEIGHT OF 2.25 LBS PER FT EXCLUSIVE OF THE ANCHOR PLATE THE ANCHOR PLATE SHALL BE 1.67 LBS OR MORE AND BE SECURELY RIVETED OR WELDED TO THE POST
4. THE GALVANIZED STEEL PIPE DIAMETER AND WEIGHT SHALL BE AS FOLLOWS

ITEM	MIN OUTSIDE DIAMETER	MIN WEIGHT PER FOOT
1 GATE POST (7'-0" MIN)	2.875 INCHES	5.79 LBS.
2 CORER POST (7'-0" MIN)	2.375 INCHES	3.65 LBS
3 BRACE POST	1.660 INCHES	2.27 LBS

ALL BRACING AND FITTINGS SHALL BE MANUFACTURERS STANDARD HARDWARE AND SHALL BE APPROVED BY THE ENGINEER

5. BARBED WIRE SHALL BE GALVANIZED STEEL, 12 GAUGE, WITH 4 POINT ROUND BARBS SPACED APPROX 5 INCHES APART
6. THE CONCRETE SHALL CONTAIN AIR ENTRAINMENT AND NOT LESS THAN 5 BAGS (94 LBS PER BAG) OF CEMENT PER CUBIC YD OF CONCRETE THE SLUMP AS TESTED BY ASTM C 143 SHALL NOT EXCEED 5 INCHES THE TIME BETWEEN THE INTRODUCTION OF THE CEMENT TO THE AGGREGATES AND THE PLACEMENT OF THE CONCRETE SHALL NOT EXCEED 1½ HOURS
7. ALL POSTS EXCEPT LINE POSTS TO BE SET IN CONCRETE AS SHOWN

AS BUILT
10/30/72

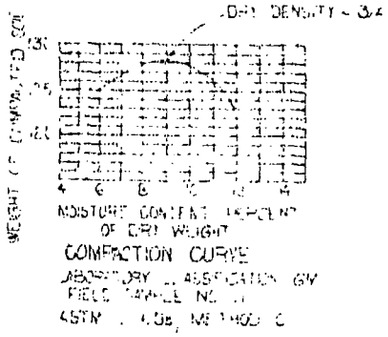
W. WAYNE

Material A (Gw)

Material B (SM)

Material A (Gw)

Note: Samples to 20.0'. Augered out to 11.0', pushed Shelby tube to 23.0', no recovery. Sampled to 31.0' through 4" casing



COMPACTION CURVE

LABORATORY CLASSIFICATION GW

FIELD SAMPLE NO. 11

ASTM D 698, METHOD C

10/20/72

COTTAMARGO CREEK WATERSHED PROJECT
SITE 16A
E. COLWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
LOGS OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NY 2C2 P

B-24

A

B

Gravel, silty w/sand (~30% gravel, 21% sand, 33% fines); max. size 6"; 2% +3"; brown; moist; medium permeability; non-plastic, loose, glacio-fluvial; DS 207.1 (GM).

C

Gravel, silty w/sand (25-33% gravel, 24-32% sand, 42-49% fines); max. size 2"; 3% +1", up to 5% 3-4"; green to green-brown; moist; slightly permeable; non-plastic to PI=2%. Fill: medium to very dense, N= 15-75; 2 wells 20-21; glacial till; DS's 204.2 (GC-GM), 205.1 (GM).

C

Gravel, silty w/sand (see note #2 below) (35-39% gravel, 28-32% sand, 33-37% fines); max. size 2"; usually < 1/2"; up to 3% +1", 2-3% 3-4" brown to gray-brown; moist; slightly permeable - natural k values of .14+4.5" /pd; non-plastic to LL= 21; Fill: 4; dense - N= 5-166, most 25-45; glacial till; DS's 204.2 (GC-GM), 204.3 (SM), 205.6 (GM).

E

Gravel, silty w/sand (23-31% gravel, 30-37% sand, 42-29% fines); max. size 10"; up to 3% +3", 20-25% 3-6"; blue-gray to gray-brown, moist; very slight permeability; non-plastic to LL= 26, PI= 6; dense, N= 18-149, most > 50; glacial till; DS's 204.4 (GM), 205.1 (GM).

E

Sand, gravelly w/silt (17% gravel, 81% sand, 9% fines); max. size 3"; brown; moist; moderate permeability; non-plastic, loose-medium - N= 11-29; glacio-fluvial; DS 205.4 (SM-SP).

G

Sand, silty (1% gravel, 75% sand, 24% fines); max. size 3/4"; brown - tan rated; rapid permeability (pipe reservoirs); non-plastic; loose - N= 3-22, most < 10; glacio-fluvial and alluvial; DS 204.2 (SM).

H

Silt, sandy w/gravel (21% gravel, 23% sand, 56% fines); max. size 1", up to 2% +3", trace 3-4" (or less); 1-3 layers; moist; slight permeability; non-plastic; medium dense to dense - N= 15-44; glacial till; DS 204.2 (ML).

I

Silt, sandy w/little gravel (10-12% gravel, 30-32% sand, 58-60% fines); max. size 4"; mottled gray-yellow brown; moist; slight permeability; non-plastic; medium; glacio-fluvial; DS's 205.1 (ML), 211.1 (ML).

J

Silt, sandy w/little gravel (10-12% gravel, 30-32% sand, 58-60% fines); max. size 4"; mottled gray-yellow brown; moist; slight permeability; non-plastic; medium; glacio-fluvial; DS's 205.1 (ML), 211.1 (ML).

K

Silt, w/little sand (~5% gravel, ~5% sand, mostly fines); max. size 1"; light brown to gray-brown; moist; dry, loose; SA similar to [illegible]; non-plastic; medium dense, N= 11-29; most < 20; alluvial and glacio-fluvial; DS's [illegible] (ML), [illegible] (ML).

L

Silt, clayey (0% gravel, 1% sand, 99% fines); max. size 1/4" to (#2" 1.5, 5%, 3.2mm 1.1+ gray, mottled; homogeneous; LL= 34, PI= 11, very stiff, alluvial (silt deposited on [illegible] (ML-CL).

M

[illegible] max. size 3" to 4" cobbles; to 5% boulders; to 3% +12"; [illegible] to gray-brown; moist; dry, loose; SA similar to [illegible]; non-plastic; medium dense, N= 11-29; most < 20; alluvial and glacio-fluvial; DS's [illegible] (ML), [illegible] (ML).

Note #1: [illegible] different [illegible] to or to [illegible] [illegible]

Note #2: [illegible] different [illegible] to or to [illegible] [illegible]

SAMPLE DESCRIPTIONS

TP #1, Center Line - 1395.8 - 7/11/68

0.0	0.7	Material M	(Topsoil)	
0.7	8.5	"	A	(GM-GP)
8.5	9.5	"	K	ML
9.5	11.5	"	A	(GM-GP) D.S. 1.1

Note: A seepage at a height of 3" to 4" at the contact. Moderate seepage 7-11:45, Caves badly. Upwall very gravelly.

TP #2, C/L Dam Elev. 1395.8 - 7/11/68

0.0	10.0	Material A	(GM-GP)	

Note: Water level @ 6.4'.

TP #3, C/L Dam Elev. 1395.4 - 7/12/68

0.0	1.0	Material M	(Topsoil)	
1.0	15.0	"	A	(GM-GP)

Note: Water level @ 4.5'. Fewer fines in A with depth.

TP #4, C/L Dam Elev. 1390.0 - 7/12/68

0.0	0.8	Material J	(ML)	
0.8	14.0	"	A	(GM-GP)

Note: Water level @ 13.0'. Mostly flaps to 8.0'; then more spheroidal from 8.0 - 14.0'

TP #5, C/L Dam Elev. 1392.4 - 7/12/68

0.0	2.0	Material J	(ML)	D.S. 1.1
2.0	17.5	"	A	(GM-GP)

TP #20L, Left Emer. Spwy. Elev. 1436.7 - 7/16/68

0.0	1.0	Material M	(Topsoil)	
1.0	14.5	"	D	(GM)

Note: Very slight seepage @ 13.5', Sandy zone @ 13.0-13.5'. Quite dry @ 1.0-4.0'.

TP #21L, Left Emer. Spwy. Elev. 1422.4 - 7/11/68

0.0	0.5	Material M	(Topsoil)	
0.5	18.0	"	D	(GM)

Note: Minor seepage @ 17.0'. Quite dry @ 1.0-4.0'.

TP #22L, Left Emer. Spwy. Elev. 1429.0 - 7/11/68

0.0	0.5	Material M	(Topsoil)	
0.5	10.0	"	D	(SM)
10.0	17.5	"	A	(GM) D.S. 203.1

Note: Moderate seepage @ 14.0'. Silty and fine sand zone @ 9.5-11.0'. Quite dry @ 1.0-4.0'.

TP #23L, Left Emer. Spwy. Elev. 1435.3 - 7/11/68

0.0	1.0	Material M	(Topsoil)	
1.0	5.0	"	H	(ML)
5.0	15.5	"	D	(GM-SM) D.S. 1.1 & 2
15.5	16.0	"	I	SM
16.0	17.5	"	A	GM

Note: [illegible] from [illegible] to [illegible] at D. Quite dry @ 1.0-4.0'.

TP #24L, Left Emer. [illegible]

[illegible]	[illegible]	Material [illegible]	
[illegible]	[illegible]	"	
[illegible]	11.5	"	
11.5	13.5	"	
13.5	15.5	"	
15.5	17.5	"	

Note: Quite slight

TP #20R, Left Emer.

0.0	0.7	Materia	
0.7	8.5	"	
8.5	12.5	"	
12.5	17.5	"	

Note: Very s

TP #21R, Right Emer.

0.0	1.0	Materia	
1.0	2.5	"	
2.5	14.0	"	

Note: Rapid s from br staining

TP #20S, Right Emer. S

0.0	1.0	Material	
1.0	2.5	"	
2.5	6.0	"	
6.0	11.5	"	
11.5	14.0	"	

Note: Rapid is through

TP #22R, Right Emer. Sp

0.0	1.0	Material	
1.0	4.0	"	
4.0	5.0	"	
5.0	14.0	"	
14.0	16.5	"	

Note: Minor se

TP #21R, Right Emer. Spw

0.0	1.0	Material	
1.0	3.0	"	
3.0	6.0	"	
6.0	14.0	"	
14.0	16.0	"	

Note: Moderate

TP #23L, Right Emer. Spwy

0.0	1.0	Material M	
1.0	3.0	"	T
3.0	4.0	"	A
4.0	5.0	"	B
5.0	6.0	"	I
6.0	8.0	"	A
8.0	17.0	"	C

Note: Minor seep dense at

	7.5	Material M	(Topsoil)		
7.5	9.5	"	B	(ML)	D.S. 205.2
9.5	11.5	"	F	(ML)	D.S. 205.3
11.5	13.5	"	F	(SM-SP)	D.S. 205.4
13.5	15.5	"	A	(GM)	D.S. 205.5
15.5	17.5	"	E	(GM)	D.S. 205.6

Note: Quite dry from (.8-3.0'). Very slight seep @ 15.5'.

TP #206, Left Emer. Spwy. Elev. 1419.1 7/16/68

0.0	0.7	Material M	(Topsoil)		
0.7	6.5	"	H	(ML)	
6.5	12.5	"	F	(SP-SM)	
12.5	17.5	"	E	(GM)	

Note: Very slight seep @ 7.0'.

TP #207, Right Emer. Spwy. Elev. 1411.5 7/17/68

0.0	1.0	Material M	(Topsoil)		
1.0	2.5	"	B	(GM)	D.S. 207.1
2.5	14.0	"	A	(GM-GW)	D.S. 207.2 D.S. 207.3

Note: Rapid inflow @ 9.5'. Color changes from brown to gray @ 6.0'. Some iron staining @ 9.5' (around water level).

TP #208, Right Emer. Spwy. Elev. 1418.1 7/17/68

0.0	1.0	Material M	(Topsoil)		
1.0	2.5	"	I	(ML)	D.S. 208.1
2.5	6.0	"	G	(SM)	D.S. 208.2
6.0	11.5	"	C	(GM)	D.S. 208.3
11.5	14.0	"	E	(GM)	D.S. 208.4

Note: Rapid inflow and severe piping throughout G.

TP #209, Right Emer. Spwy. Elev. 1415.0 7/17/68

0.0	1.0	Material M	(Topsoil)		
1.0	4.0	"	B	(GM)	
4.0	5.0	"	A	(GM-GW)	
5.0	14.0	"	C	(GM)	
14.0	16.5	"	L	(GM)	

Note: Minor seep @ 8.0'.

TP #210, Right Emer. Spwy. Elev. 1423.5 7/17/68

0.0	1.0	Material M	(Topsoil)		
1.0	3.5	"	B	(GM)	
3.5	6.5	"	A	(GM-GW)	
6.5	14.5	"	C	(GM)	D.S. 210.1
14.5	15.5	"	L	(GM)	

Note: Moderate seep @ 6.5'.

TP #211, Right Emer. Spwy. Elev. 1419.6 7/17/68

0.0	0.5	Material M	(Topsoil)		
0.5	3.0	"	I	(ML)	
3.0	3.5	"	A	(GW-GM)	
3.5	5.0	"	B	(GM)	
5.0	7.0	"	I	(ML)	D.S. 211.1
7.0	8.5	"	A	(GW-GM)	
8.5	15.5	"	C	(GM)	

Note: Minor seep @ 7.0-8.0'. C very dense at depth.

TP #[illegible], Left Emer. Spwy. Elev. [illegible]

0.0	2.0	Material A	(GW-GM)		

Note: water level @ 2.5', Caves readily.

TP #301, Left Spwy. #1 Elev. 1376.1 7/12/68

0.0	1.0	Material M	(Topsoil)		
1.0	3.0	"	A	(GW-GM)	
3.0	4.0	"	E	(GM)	
4.0	5.0	"	A	(GW-GM)	

Note: water @ 1.5' (stream level). Caves readily.

TP #303, Prin. Spwy. #1 Elev. 1376.6 7/12/68

0.0	6.0	Material A	(GW-GP)		
6.0	11.0	"	I	(ML)	

Note: Water level @ 1.5' (stream level). Caves readily in A. I has extreme dilatancy, flows readily when shaken.

TP #401, Outlet Channel #1 Elev. 1377.6 7/11/68

0.0	3.0	Material A	(GM)		
3.0	12.0	"	L	(CL-ML)	D. S. 401.1

Note: Water level @ 2.0'.

TP #402, Outlet Channel #1 Elev. 1374.5 7/15/68

0.0	12.0	Material A	(GM)		

Note: Caves readily. Water level @ 0.0'

TP #403, Outlet Channel #2 Elev. 1381.1 5/1/68

0.0	0.5	Material M	(Topsoil)		
0.5	4.5	"	A	(GW)	D.S. 403.1
4.5	12.0	"	K	(ML)	D. S. 403.2

Note: Water level @ 4.0'. Topsoil is gravelly. Caves readily in A. K exhibits extreme dilatancy and flows easily when shaken.

TP #404, Outlet Channel #2 Elev. 1381.0 8/1/68

0.0	1.0	Material M	(Topsoil)		
1.0	11.0	"	A	(GW)	

Note: Water level @ 4.5', Caves readily Topsoil is gravelly.

TP #[illegible], Dead Line Elev. 1381.[illegible] 7/11/68

0.0	1.5	Material M	(Topsoil)		
1.5	10.0	"	A	(GW-GP)	
10.0	14.5	"	E	(GM)	D.S. 501.1

Note: Strong seep @ 4.5'. Caves readily in A.

TP #[illegible], Dead Line Elev. 1381.[illegible] 7/11/68

0.0	0.7	Material M	(Topsoil)		
0.7	4.0	"	A	(GW-GP)	
4.0	5.0	"	K	(ML)	
5.0	11.7	"	A	(GW-GP)	

Note: water level @ [illegible]', Caves readily in A. I occurs at a seam tapering out to the north.

TP #[illegible], Line Elev. 1381.3 7/11/68

0.0	12.0	Material A	(GW-GP)		

Note: water level @ 1.2'

TP #[illegible], Line Elev. 1381.4 7/12/68

0.0	1.0	Material J	(ML)		
1.0	10.0	"	A	(GW-GP)	
10.0	12.0	"	K	(ML)	

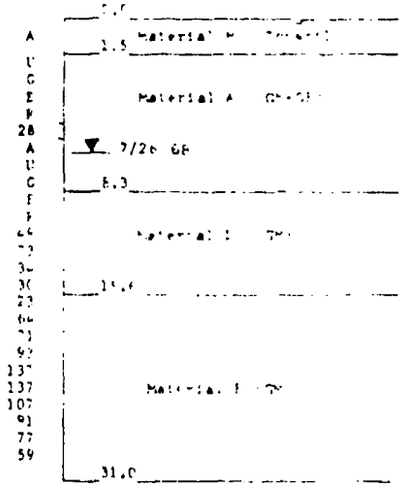
Note: Water level @ [illegible]

TP #[illegible], Line Elev. [illegible]

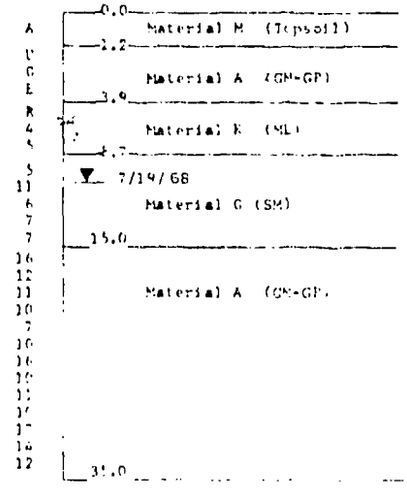
[illegible]	[illegible]	Material [illegible]			
[illegible]	[illegible]	"	A	[illegible]	

Note: water level @ [illegible]

DH #51, C/L Dam Elev. [illegible]



DH #52, C/L Dam Elev. 1383.[illegible] 7/19/68

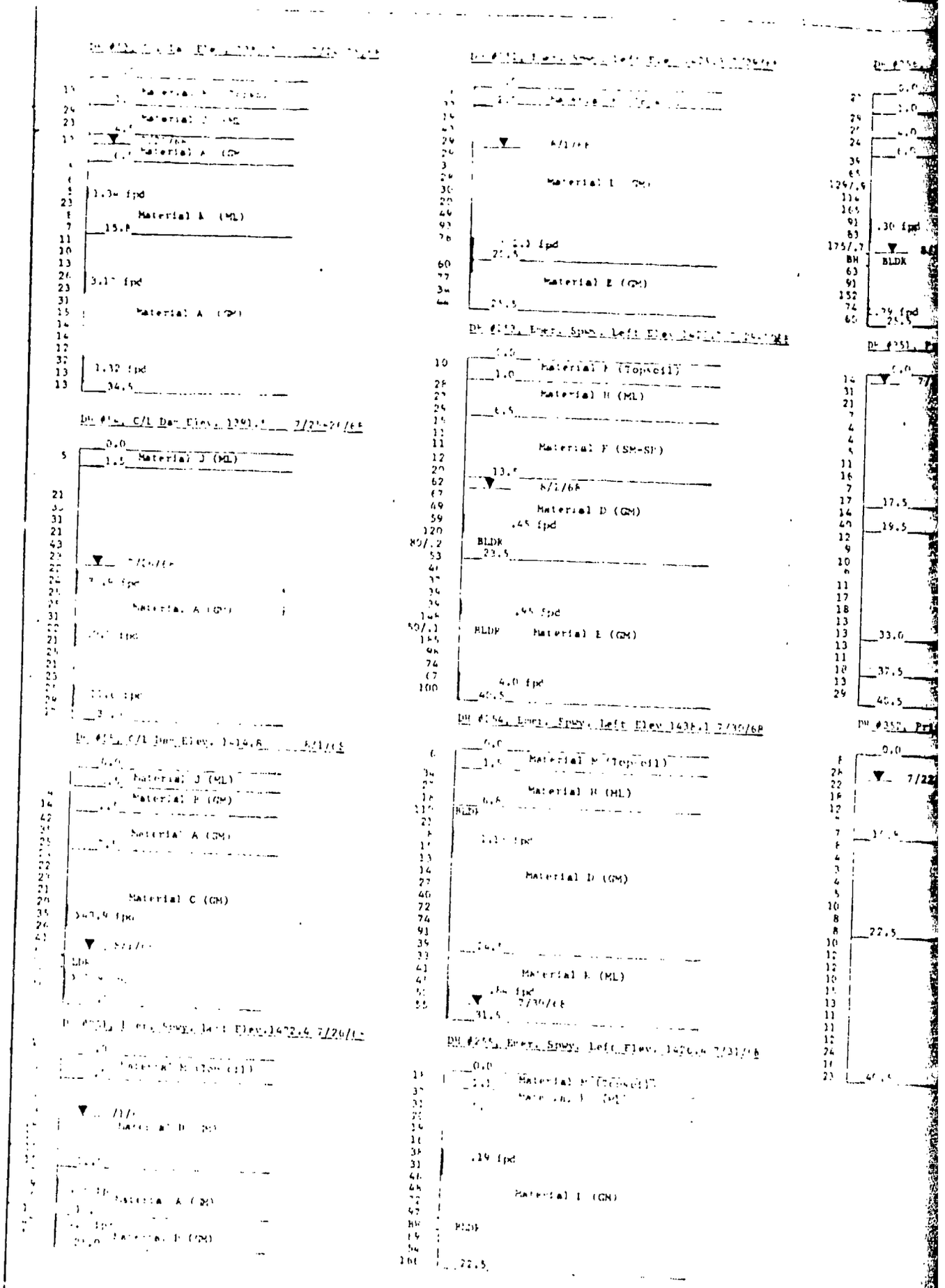


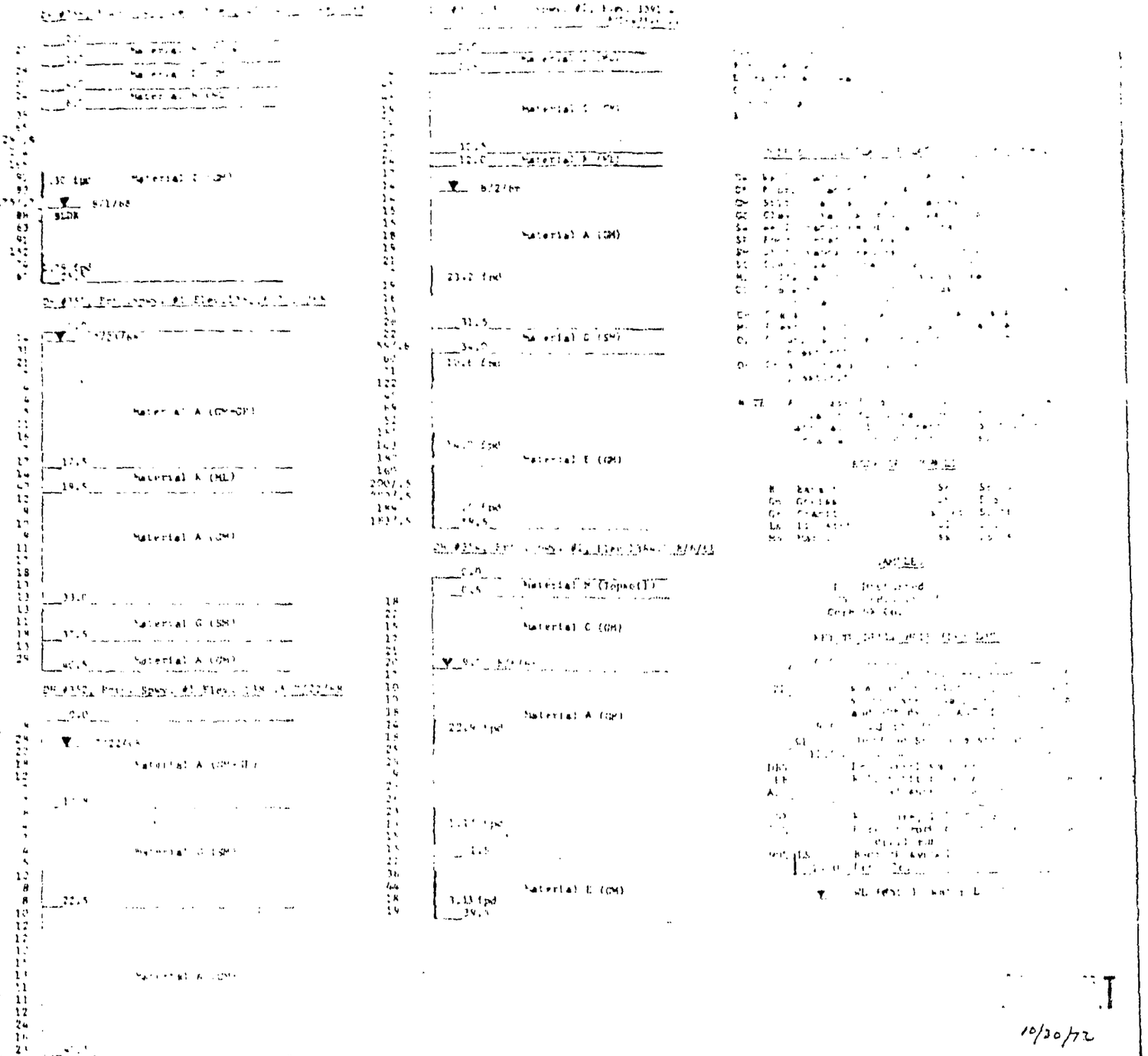
10/30/72

CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
LOCS OF TEST HOLES

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

[illegible] 10/24/68





10/30/72

CONEWANGO CREEK WATERSHED PROJECT
SITE 16A
FREEDOM BROOK DAM
CATTARAUGUS COUNTY NEW YORK
LOGS OF TEST HOLES

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

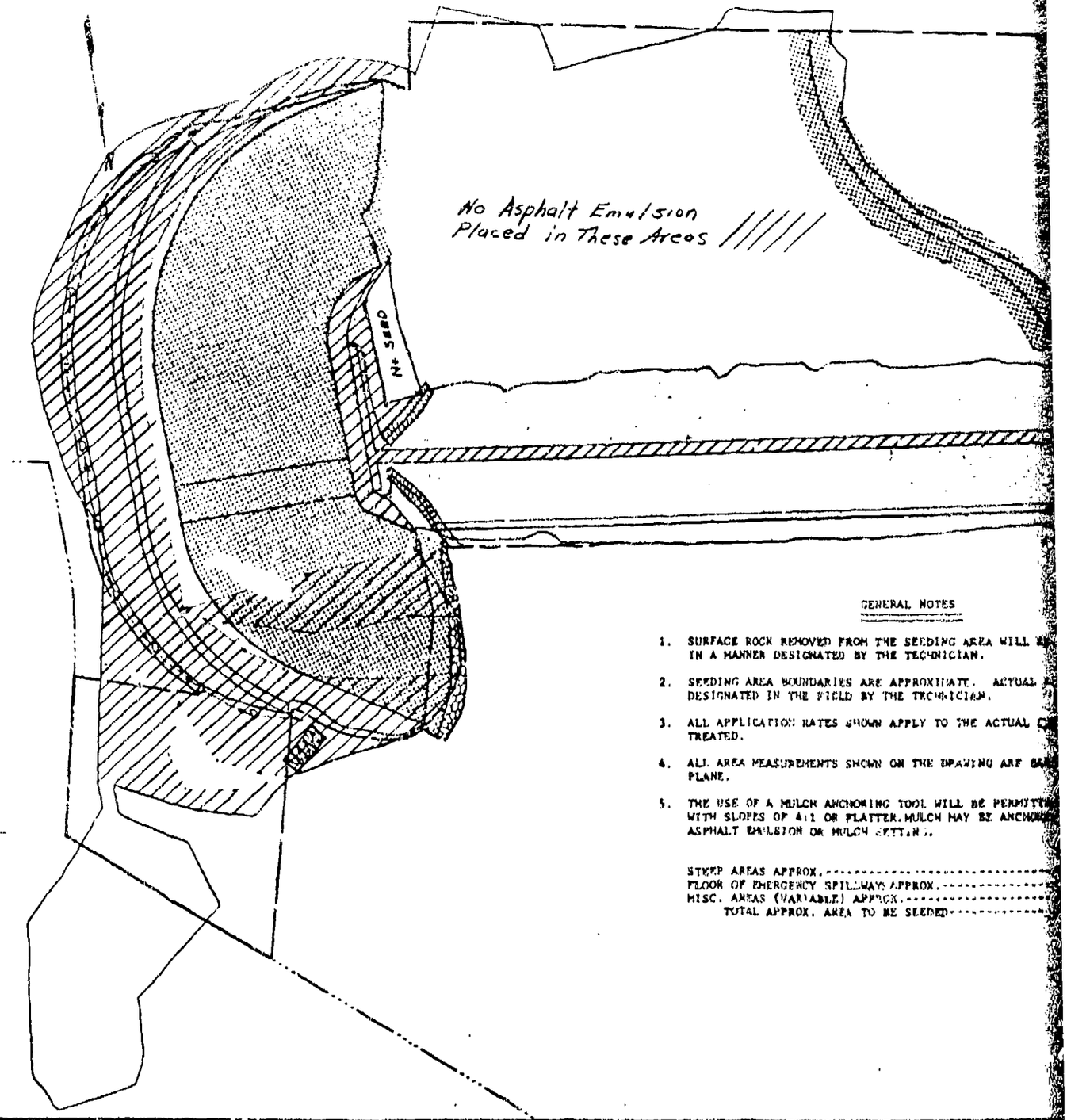
STATE CONSERVATION ENGINEER

NY-216-P

B-26

2

SEED MIXTURE	LIME	FERTILIZER	MULCH	MULCH TIE-DOWN	EXTRA SEED
RATE PER ACRE PURE LIVE SEED 15 LBS. SMOOTH BROMEGRASS (Lincoln Type) 4 LBS. RED CANARYGRASS 4 LBS. BLACKWELL SWITCHGRASS 1 LBS. REDTOP 4 LBS. EMPIRE BIRDSFOOT TREFOIL	AGRICULTURAL GROUND LIMESTONE 4000 LBS./ACRE	8-24-24 FIXED FERTILIZER AT 1000 LBS./ACRE OR EQUIVALENT	STRAW OR GRASS HAY AT 4000 LBS./ACRE	ASPHALT EMULSION RS-2 AT 150 GALLONS PER ACRE	4 LBS. PURE LIVE SEED CHEMING CROWN VETCH PER ACRE TO BE ADDED TO BASIC SEED MIXTURE SHOWN AND APPLIED ON STEEP AREAS SEE LEGEND
TO BE APPLIED ON ALL DISTURBED AREAS			ON STEEP AREAS AND FLOOR OF EMERGENCY SPILLWAYS	TO BE APPLIED ON ALL STEEP AREAS	



GENERAL NOTES

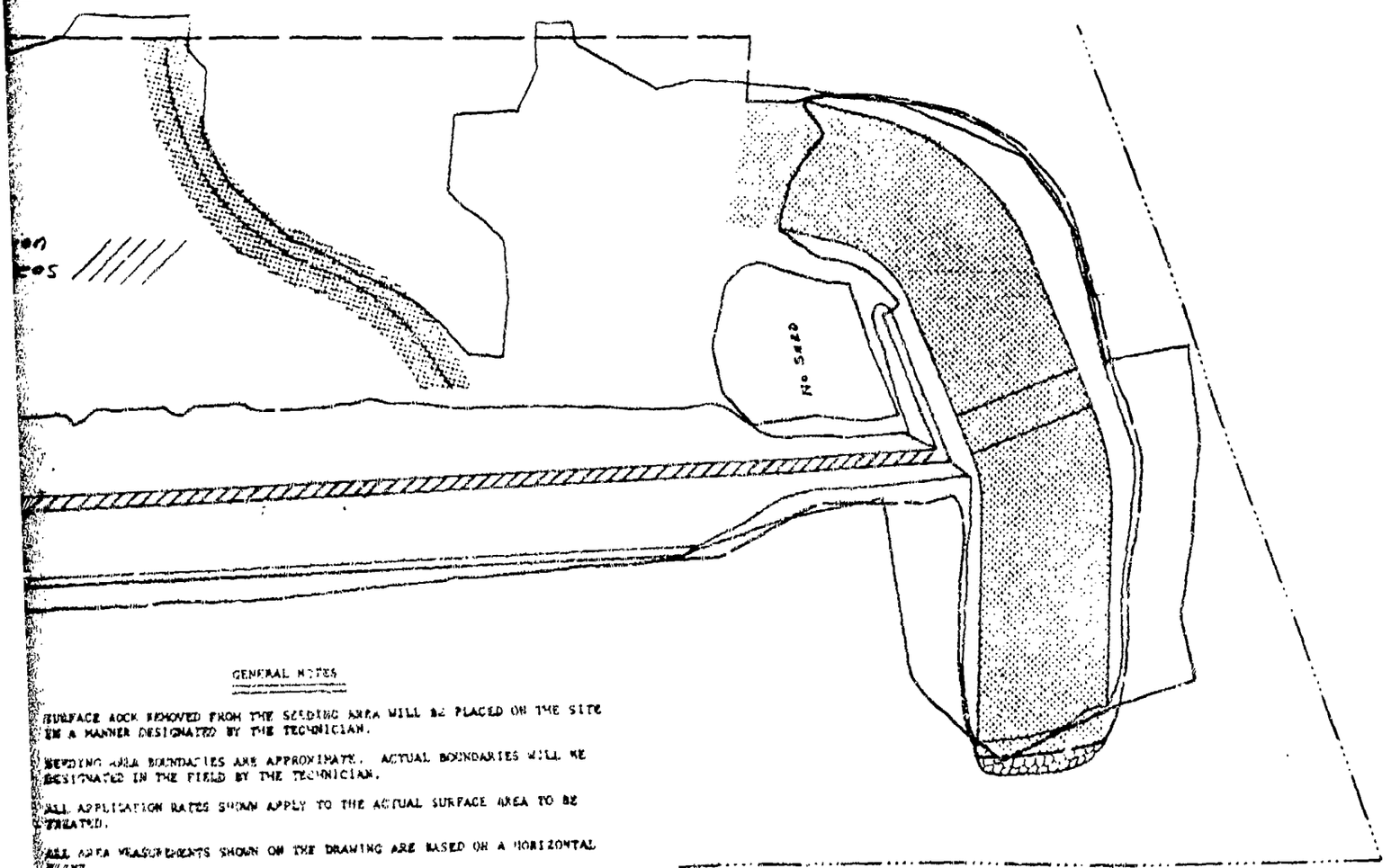
1. SURFACE ROCK REMOVED FROM THE SEEDING AREA WILL BE ... IN A MANNER DESIGNATED BY THE TECHNICIAN.
2. SEEDING AREA BOUNDARIES ARE APPROXIMATE. ACTUAL ... DESIGNATED IN THE FIELD BY THE TECHNICIAN.
3. ALL APPLICATION RATES SHOWN APPLY TO THE ACTUAL ... TREATED.
4. ALL AREA MEASUREMENTS SHOWN ON THE DRAWING ARE ... PLANE.
5. THE USE OF A MULCH ANCHORING TOOL WILL BE PERMITTED ... WITH SLOPES OF 4:1 OR FLATTER. MULCH MAY BE ANCHORED ... ASPHALT EMULSION OR MULCH NETTING.

STEEP AREAS APPROX. .....
FLOOR OF EMERGENCY SPILLWAYS APPROX. .....
MISC. AREAS (VARIABLE) APPROX. .....
TOTAL APPROX. AREA TO BE SEEDED .....

	RATE, SEED
SION GALLONS	4 LBS PURE LIVE SEED CROWNING CROWN VETCH PER ACRE TO BE ADDED TO BASIC SEED MIXTURE SHOWN AND APPLIED ON STEEP AREAS SEE LEGEND
APPLIED ON ALL STEEP AREAS	

LEGEND

AS BUILT SEEDING LIMIT



GENERAL NOTES

SURFACE ROCK REMOVED FROM THE SEEDING AREA WILL BE PLACED ON THE SITE IN A MANNER DESIGNATED BY THE TECHNICIAN.

SEEDING AREA BOUNDARIES ARE APPROXIMATE. ACTUAL BOUNDARIES WILL BE DESIGNATED IN THE FIELD BY THE TECHNICIAN.

ALL APPLICATION RATES SHOWN APPLY TO THE ACTUAL SURFACE AREA TO BE TREATED.

ALL AREA MEASUREMENTS SHOWN ON THE DRAWING ARE BASED ON A HORIZONTAL PLANE.

THE USE OF A MULCH ANCHORING TOOL WILL BE PERMITTED ONLY ON AREAS WITH SLOPES OF 4:1 OR FLATTER. MULCH MAY BE ANCHORED ON STEEP AREAS BY ASPHALT EMULSION OR MULCH NETTING.

	ACRES
STEEP AREAS APPROX.	12.0
FLOOR OF EMERGENCY SPILLWAY APPROX	8.6
MISC. AREAS (VARIABLE) APPROX.	17.0
TOTAL APPROX AREA TO BE SEEDED	37.7

10/30/72

0 50 100 200
SCALE IN FEET

CONEWANGO CREEK WATERSHED PROJECT
SITE 16 A
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK

PLAN OF VEGETATIVE TREATMENT

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

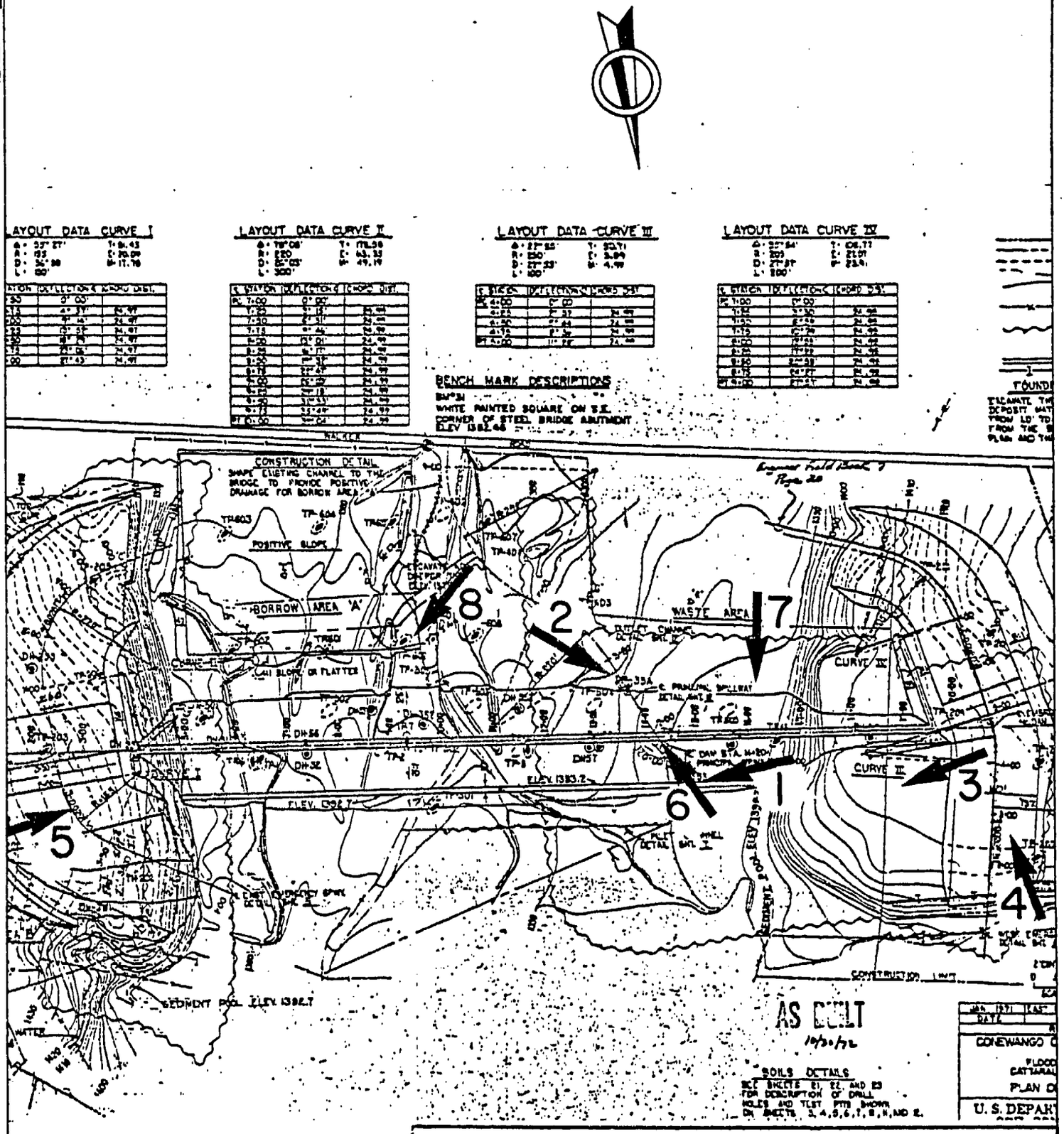
E McPHERRON 2/73
D BURDICK 2/73

230 NY-216E-V

B-27

APPENDIX C

PHOTOGRAPHS

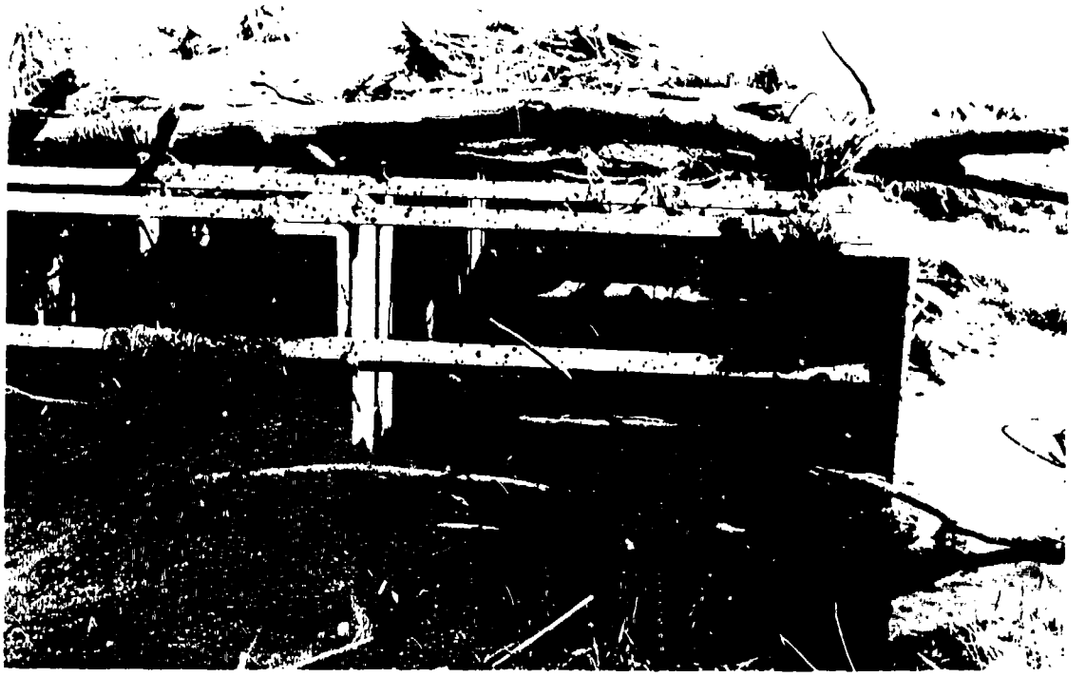


CONEWANGO CREEK DAM (SITE 16A)

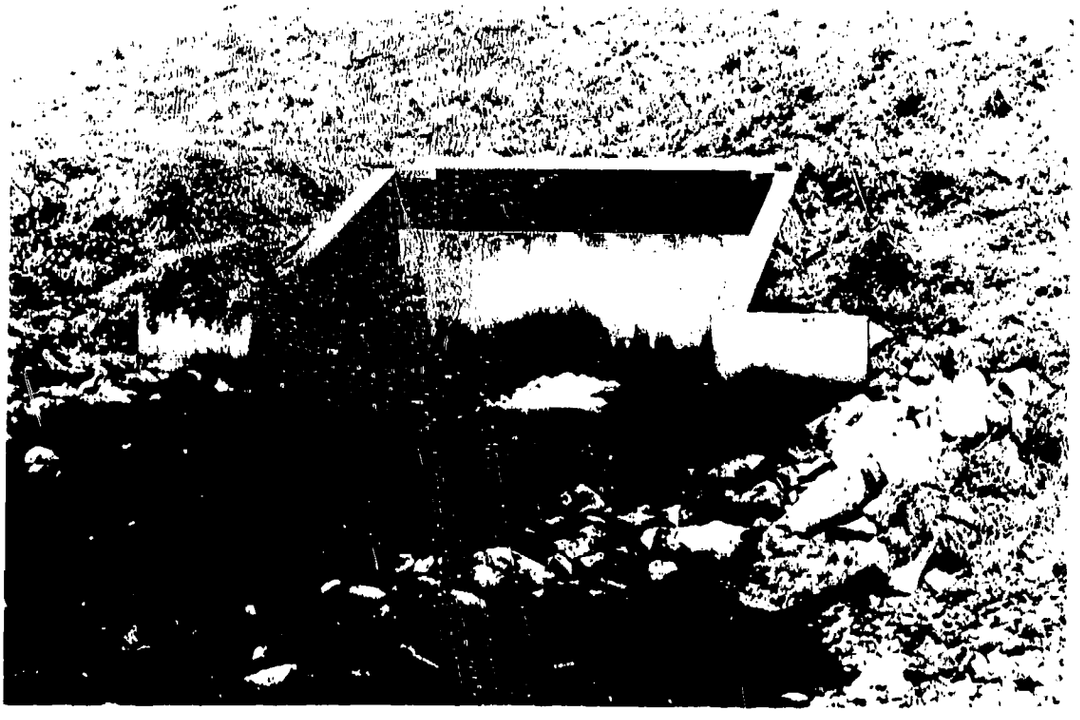
NY00557

PHOTO ORIENTATION PLAN

ERDMAN, ANTHONY, ASSOCIATES CONSULTING ENGINEERS & PLANNERS	DATE MAY 1981	C-1



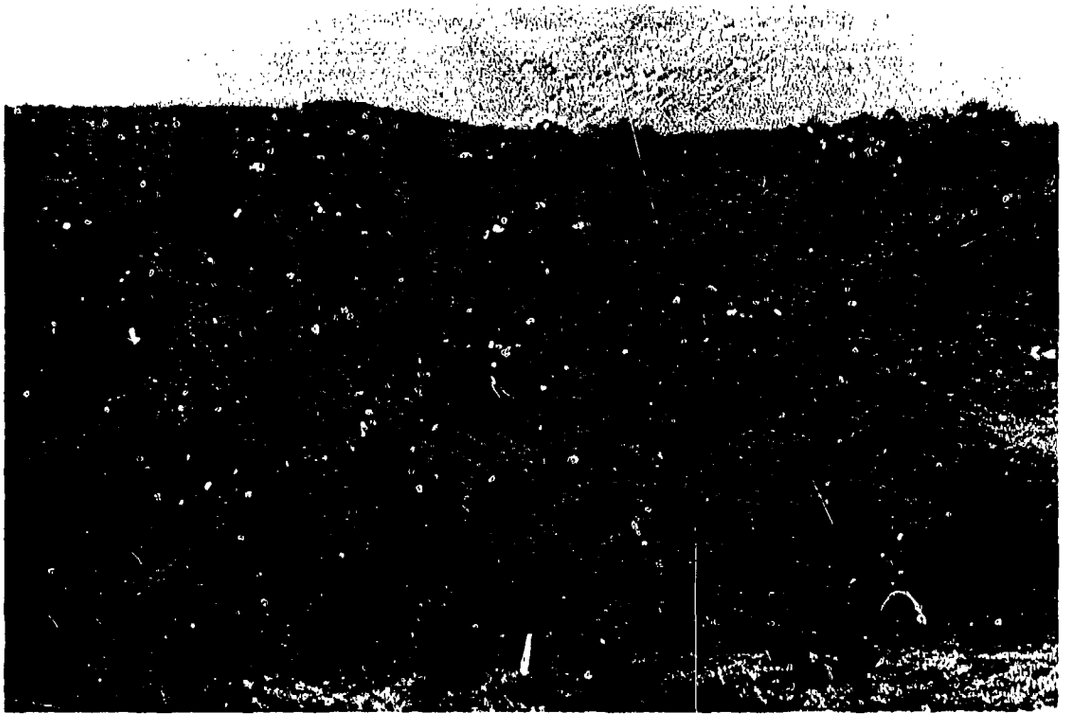
1. Principal Spillway inlet structure



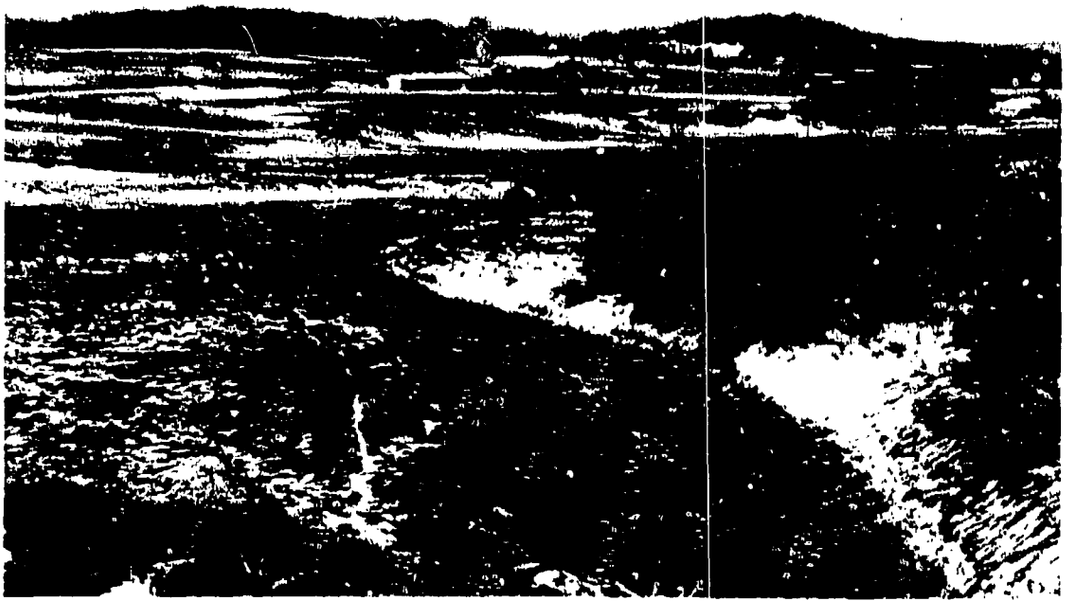
2. Principal Spillway impact basin

3. Impoundment and principal spillway inlet structure

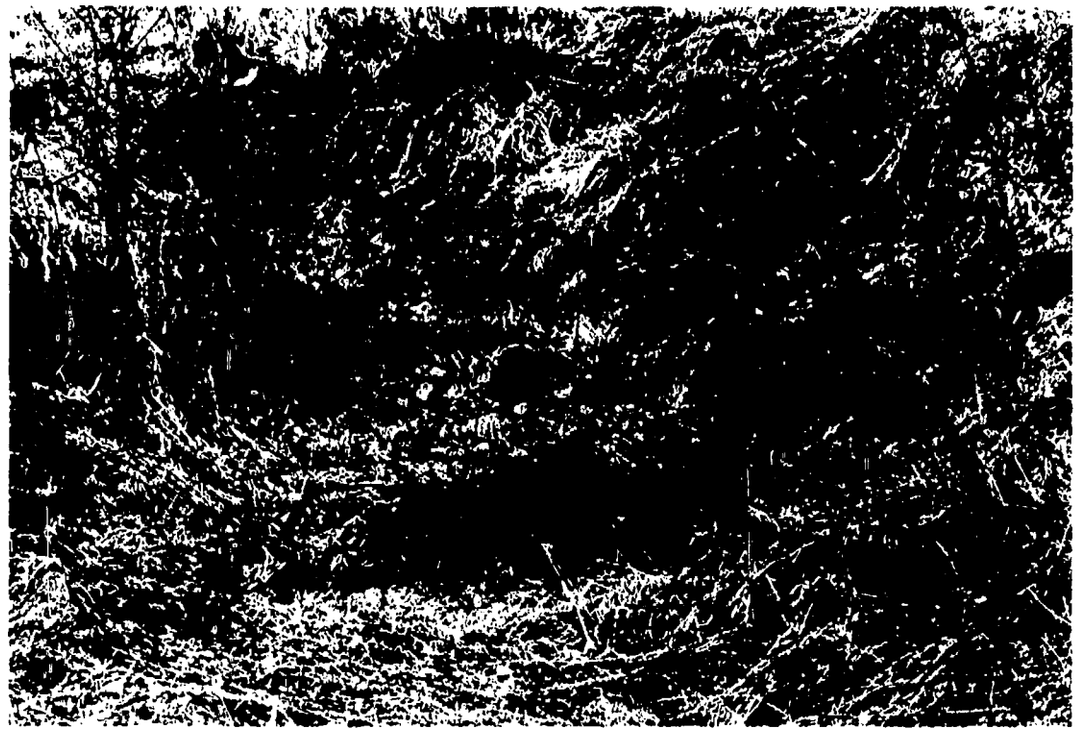
4. West emergency spillway



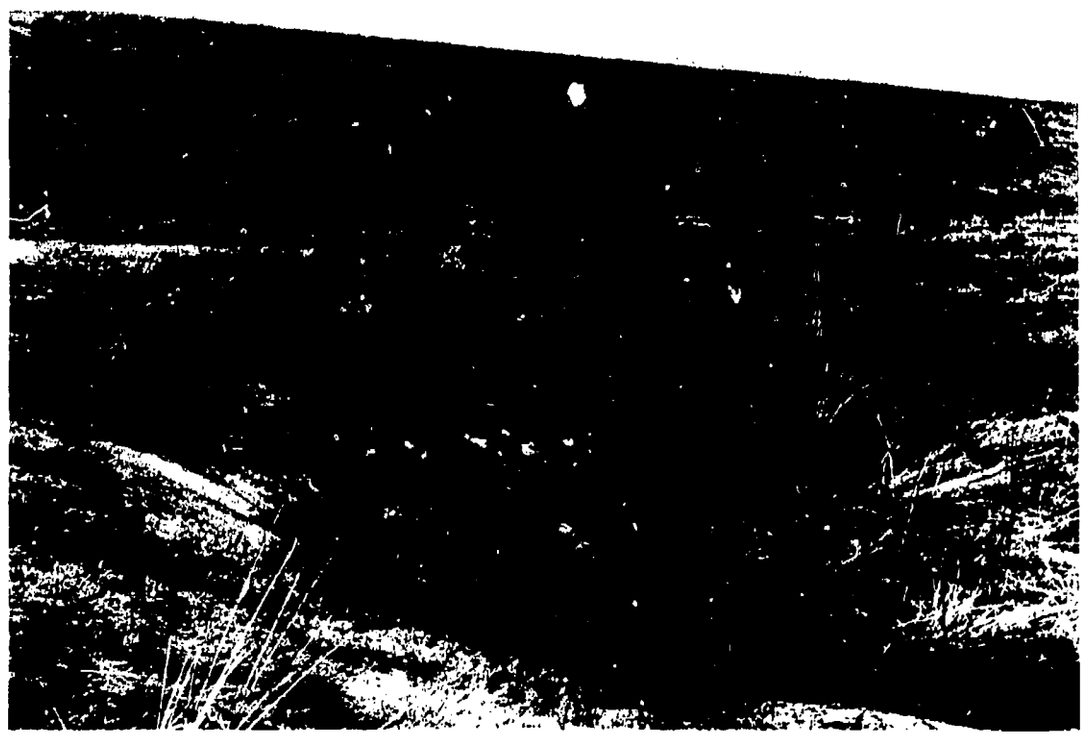
5. Upstream face of dam



6. Downstream channel



7. Outlet end of west seepage drain

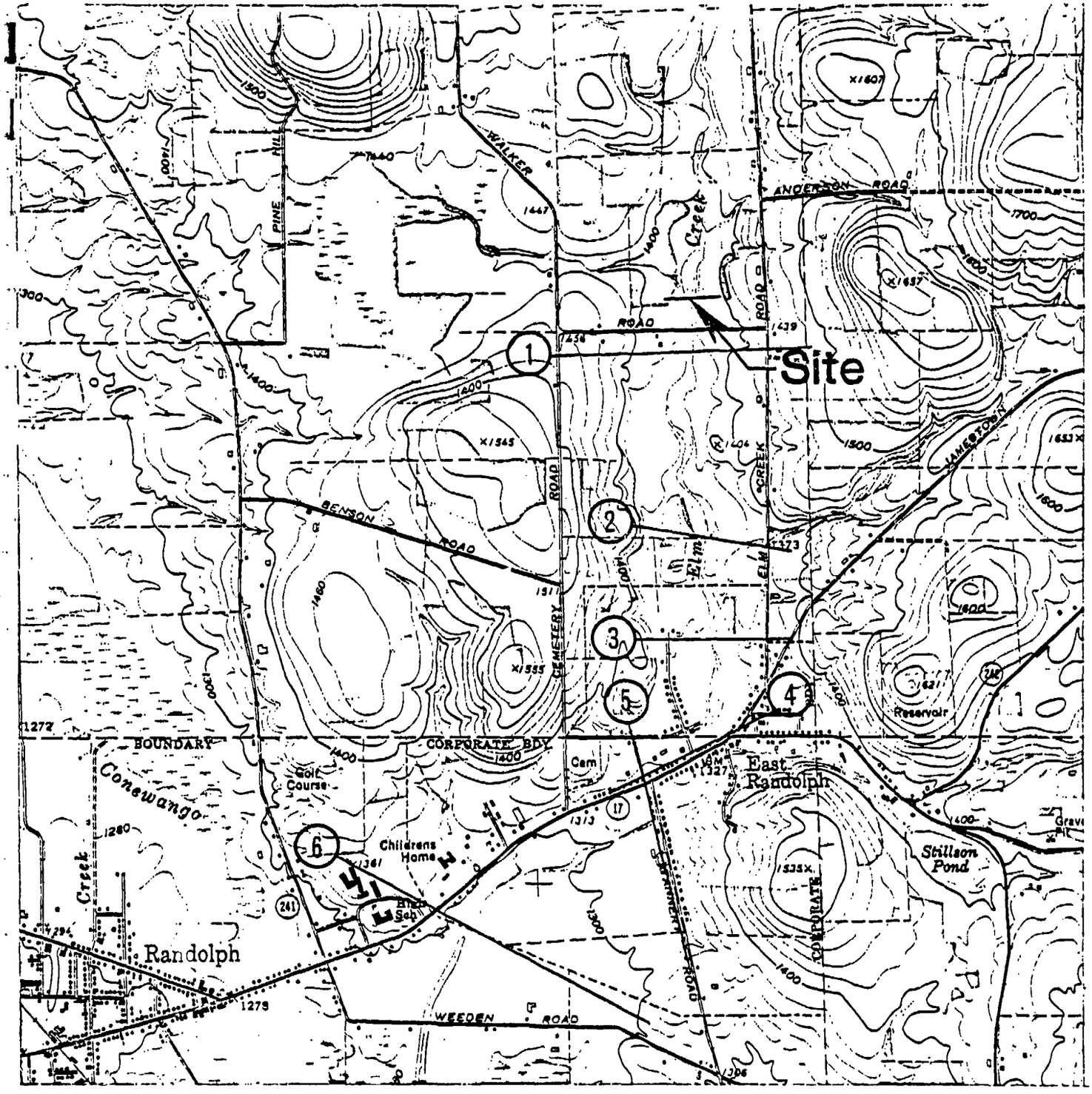


8. Outlet of east seepage drain

APPENDIX D

HYDRAULIC AND HYDROLOGIC COMPUTATIONS

APPENDIX D



Conewango Creek Dam
(Site 16A)

CROSS SECTION LOCATION PLAN

Scale: 1"=2000'

```
A1       ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF                DAM NY 557
A2       HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF CONEVANGO CREEK DAM
A3       RATIOS OF PMF ROUTED THROUGH THE RESERVOIR AND DOWNSTREAM
B    100        0       15                                  0      -1        4
B1     5
J      1        6        1
J1   0.2      0.4      0.5      0.6      0.8      1.0
K      0  INFLOW                        0        0        1
K1       CALCULATION OF INFLOW HYDROGRAPH TO DAM NY593
M      1        1      8.0             13.6        0                          1
P      0     22.7      114      124      138      148
T                                                  1.0      0.1                  0
W   3.87     0.63
X    2.0     -.10      2.0
K      1 OUTFLOW                                   1
K1       CALCULATION OF OUTFLOW HYDROGRAPH FROM DAM NY593
Y                                  1        1
Y1     1                                        -1554.5       -1
Y41554.5     1560     1570     1576     1578     1580     1581     1582     1583     1584
Y4   1585     1586     1587     1588     1589     1590
Y5      0       53       98      104      109     2592     4699     7219    10044    13249
Y5  16770    20590    24698    29084    33740    38777
$A     18    38.19   114.08      143   185.24   281.8
$E1554.5     1560     1570     1576     1580     1590
$$  1578.
$D   1587      2.7      1.5      720
K      1        1                                   1
K1     CHANNEL ROUTING -MOD PULS RESERVOIR - 1
Y                                  1        1
Y1     1
Y6   .045      .04     .045     1535     1600     1600   0.0006
Y7      0     1600      550     1560     1060     1539     1070     1535     1080     1535
Y7   1050     1539     1250     1560     1500     1600        1
K      1        2                                   1
K1     CHANNEL ROUTING -MOD PULS REACH 1-2
Y                                  1        1
Y1     1
Y6   .045      .04     .045     1495     1580     3600   0.0110
Y7      0     1580      300     1560   722.5     1500      745     1495      760     1495
Y7  777.5     1500     1200     1560     1300     1500
K      1        3                                   1
K1     CHANNEL ROUTING -MOD PULS REACH 2-3
Y                                  1        1
Y1     1
Y6   .045      .04     .045     1445     1500     3600   0.0139
Y7      0     1500      200     1480   400.5     1450      418     1445      438     1445
Y7  455.5     1450      800     1480      880     1500
K      1        4                                   1
K1     CHANNEL ROUTING -MOD PULS REACH 3-4
Y                                  1        1
Y1     1
Y6   .045      .04     .045     1426     1480     1100   0.0110
Y7      0     1480      450     1440      725     1431    742.5     1426    762.5     1426
Y7    700     1431     1010     1440     1300     1460
K      1        5                                   1
K1     CHANNEL ROUTING -MOD PULS REACH 4-5
Y                                  1        1
```

```
Y1      1
Y6   .045      .04      .045     1390     1450     2600  0.0140
Y7       0     1450       610     1420    872.5     1395     890     1390      910     1390
Y7   927.5     1395      1700     1420     2350     1450
K        0  INFLOW                            0        0       1
K1        CALCULATION OF INFLOW HYDROGRAPH TO DAM NY557 DOWNSTREAM OF DAM NY593
M        1        1      5.6                13.6        0                              1
P        0     22.7       114      124      138      148
T                                                          1.0      0.1                 0
W     3.09     0.63
X      2.0     -.13      2.0
K        2 COMBINE                                                 1
K1        COMBINE OUTFLOW FROM DAM NY593 WITH UNREGULATED RUNOFF TO DAM NY557.
K        1 OUTFLOW
K1        CALCULATION  OF OUTFLOW HYDROGRAPH FROM DAM NY557
Y                                          1        1
Y1       1                                                      -1392.7      -1
Y41392.7    1398.    1403.    1400.    1413.    1414.    1415.    1416.    1417.    1418.
Y4 1419.    1420.    1421.    1422.    1423.
Y5       0     128.     178.     217.     250.    1583.    4039.    7229.   11824.   15400.
Y520221.    25576.   31286.   37395.   44022.
$A   14.4     19.1     33.6     45.1     62.5     71.3     81.0    102.0
$E1392.7    1395.    1400.    1405.    1410.    1413.   1415.6   1421.6
$$   1413
$D1421.6      2.7      1.5   1579.8
K        1        1                                                 1
K1     CHANNEL ROUTING -MOD PULS RESERVOIR -1
Y                                          1        1
Y1       1
Y6    .04      .04      .04     1370     1420     1410  0.0052
Y7       0     1420      675     1380      945     1375    962.5     1370     987.5     1370
Y7   1005     1375     1210     1380     1910     1420
K        1        2                                                 1
K1     CHANNEL ROUTING -MOD PULS REACH 1-2
Y                                          1        1
Y1       1
Y6    .04      .04      .04     1338     1380     2800  0.0110
Y7       0     1380      450     1360     1270     1343   1287.5     1338    1312.5     1338
Y7   1330     1343     2075     1360     2150     1380
K        1        3                                                 1
K1     CHANNEL ROUTING -MOD PULS REACH 2-3
Y                                          1        1
Y1       1
Y6    .04      .04      .04     1322     1380     1600  0.0100
Y7       0     1380      610     1360      980     1327    997.5     1322    1022.5     1322
Y7   1040     1327     1910     1360     2010     1380
K        1        4                                                 1
K1     CHANNEL ROUTING -MOD PULS REACH 3-4
Y                                          1        1
Y1       1
Y6    .06      .05      .06     1310     1325     2100  0.0020
Y7       0     1325      250     1320      275     1317    282.5     1310    317.5     1310
Y7    325     1317      350     1320      600     1325
K        1        5                                                 1
K1     CHANNEL ROUTING -MOD PULS REACH 4-5
Y                                          1        1
Y1       1
```

```
Y6    .06     .05     .06    1306    1320    2400   0.0088
Y7       0    1320    1865    1311    1875    1306     1925    1306    1935    1311
Y7    2800    1320    3500    1320    3600    1320
K        1       6                                        1
K1    CHANNEL ROUTING -MOD PULS REACH 5-6
                                      1       1
Y
Y1       1
Y6    .04     .05     .04    1283    1320    1800   0.0072
Y7       0    1320     150    1300    1300    1290     2865    1283    2885    1283
Y7    3300    1300    3600    1320    3700    1320
K       99
A
```

```
OK, SEG #HEC1DB
ENTER PROJECT NUMBER
80166-00.03
INPUT FILE ? NY557
1**********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION     JULY 1978
   LAST MODIFICATION  26 FEB 79
 **********************************
1                          PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS
                                   RUNOFF HYDROGRAPH AT      INFLOW
                                   ROUTE HYDROGRAPH TO       UTFLOW
                                   ROUTE HYDROGRAPH TO            1
                                   ROUTE HYDROGRAPH TO            2
                                   ROUTE HYDROGRAPH TO            3
                                   ROUTE HYDROGRAPH TO            4
                                   ROUTE HYDROGRAPH TO            5
                                   RUNOFF HYDROGRAPH AT      INFLOW
                                   COMBINE  2 HYDROGRAPHS AT OMBINE
                                   ROUTE HYDROGRAPH TO       UTFLOW
                                   ROUTE HYDROGRAPH TO            1
                                   ROUTE HYDROGRAPH TO            2
                                   ROUTE HYDROGRAPH TO            3
                                   ROUTE HYDROGRAPH TO            4
                                   ROUTE HYDROGRAPH TO            5
                                   ROUTE HYDROGRAPH TO            6
                                   END OF NETWORK

1**********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION     JULY 1978
   LAST MODIFICATION  26 FEB 79
 **********************************

 RUN  DATE: 5/08/
      TIME: 3:39 PM
```

ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF — DAM NY 557
HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF CONEWANGO CREEK DAM
RATIOS OF PMF ROUTED THROUGH THE RESERVOIR AND DOWNSTREAM

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
100	0	15	0	0	0	0	-1	4	0
			JOPER	NUT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 6 LRTIO= 1

RTIOS= 0.20 0.40 0.50 0.60 0.80 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

CALCULATION OF INFLOW HYDROGRAPH TO DAM NY593

	ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
INFLOW		0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	8.00	0.00	13.60	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.70	114.00	124.00	138.00	148.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.811

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 3.87 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= 2.00 QRCSN= -0.10 RTIOR= 2.00

UNIT HYDROGRAPH 85 END-OF-PERIOD ORDINATES, LAG= 3.85 HOURS, CP= 0.63 VOL= 1.00

14.	54.	110.	177.	251.	329.	412.	498.	584.	664.
731.	786.	827.	855.	869.	868.	845.	799.	745.	694.
647.	603.	562.	524.	488.	455.	424.	396.	369.	344.
320.	299.	278.	259.	242.	225.	210.	196.	182.	170.
158.	148.	138.	128.	120.	111.	104.	97.	90.	84.
78.	73.	68.	64.	59.	55.	51.	48.	45.	42.
39.	36.	34.	31.	29.	27.	25.	24.	22.	21.
19.	18.	17.	16.	14.	14.	13.	12.	11.	10.
10.	9.	8.	8.	7.					

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	27.23	23.47	3.76	4000E0.
										(692.)(596.)(95.)(11328.43)			

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HYDROGRAPH ROUTING

CALCULATION OF OUTFLOW HYDROGRAPH FROM DAM NY593

	ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
OUTFLOW		1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPRP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1555.	-1

OK, SEG #HEC1DB

STAGE	1554.50	1560.00	1570.00	1576.80	1578.00	1580.00	1581.00	1582.00	1583.00	1584.00
	1585.00	1586.00	1587.00	1588.00	1589.00	1590.00				
FLOW	0.00	53.00	98.00	104.00	109.00	2592.00	4699.00	7219.00	10044.00	13245.00
	16770.00	20590.00	24698.00	29084.00	33740.00	38777.00				
SURFACE AREA=	18.	38.	115.	143.	185.	282.				
CAPACITY=	0.	151.	882.	1654.	2309.	4627.				
ELEVATION=	1555.	1560.	1570.	1576.	1580.	1590.				

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1578.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1587.0	2.7	1.5	720.

PEAK OUTFLOW IS 103. AT TIME 48.00 HOURS

PEAK OUTFLOW IS 3346. AT TIME 46.50 HOURS

PEAK OUTFLOW IS 5208. AT TIME 45.50 HOURS

PEAK OUTFLOW IS 6964. AT TIME 45.00 HOURS

PEAK OUTFLOW IS 10275. AT TIME 44.50 HOURS

PEAK OUTFLOW IS 13395. AT TIME 44.25 HOURS

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS RESERVOIR - 1

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1	0	0	0	0	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPRP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0450	0.0400	0.0450	1535.0	1600.0	1600.	0.00060

OK, SEG NHEC1UB

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1600.00 550.00 1560.00 1060.00 1539.00 1070.0 1535.00 1080.00 1535.00
1090.00 1539.00 1250.00 1560.00 1500.00 1600.00

STORAGE	0.00	2.33	10.80	32.82	66.55	118.00	181.16	258.04	347.40	449.61
	552.41	667.81	791.00	924.39	1068.58	1215.37	1373.75	1540.73	1716.31	1901.48
OUTFLOW	0.00	98.93	586.68	2101.67	5213.07	10391.82	18057.20	28594.54	43070.29	61124.74
	82532.20	107427.23	135950.88	168247.16	204461.56	244739.22	289225.00	338062.38	391393.88	449361.31
STAGE	1535.00	1538.42	1541.84	1545.26	1548.68	1552.10	1555.53	1558.95	1562.37	1565.79
	1569.21	1572.63	1576.05	1579.47	1582.89	1586.31	1589.73	1593.16	1596.58	1600.00
FLOW	0.00	98.93	586.68	2101.67	5213.07	10391.82	18057.20	28594.54	43070.29	61124.74
	82532.20	107427.23	135950.88	168247.16	204461.56	244739.22	289225.00	338062.38	391393.88	449361.31

MAXIMUM STAGE IS 1538.4

MAXIMUM STAGE IS 1546.6

MAXIMUM STAGE IS 1548.7

MAXIMUM STAGE IS 1549.8

MAXIMUM STAGE IS 1552.0

MAXIMUM STAGE IS 1553.4

D-9

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 1-2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0450	0.0400	0.0450	1495.0	1580.0	3600.	0.01100

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1580.00 300.00 1560.00 722.50 1500.00 745.00 1495.00 760.00 1495.00
777.50 1500.00 1200.00 1560.00 1300.00 1580.00

STORAGE	0.00	12.16	41.47	94.81	169.84	268.96	391.37	537.08	706.89	891.39
	1113.98	1352.86	1615.04	1900.51	2209.28	2542.42	2907.27	3305.21	3736.22	4206.31
OUTFLOW	0.00	1151.63	6185.43	17079.25	35667.80	63594.73	102360.63	153365.16	217930.41	297315.94
	392729.50	505334.19	636255.13	786584.80	957382.13	1142095.50	1344594.00	1575489.75	1835714.25	2126391.50
STAGE	1495.00	1499.47	1503.95	1508.42	1512.89	1517.37	1521.84	1526.32	1530.79	1535.26
	1539.74	1544.21	1548.68	1553.16	1557.63	1562.10	1566.58	1571.05	1575.53	1580.00
FLOW	0.00	1151.63	6185.43	17079.25	35667.80	63594.73	102360.63	153365.16	217930.41	297315.94
	392729.50	505334.19	636255.13	786584.80	957382.13	1142095.50	1344594.00	1575489.75	1835714.25	2126391.50

MAXIMUM STAGE IS 1495.4

MAXIMUM STAGE IS 1501.4

MAXIMUM STAGE IS 1503.1

MAXIMUM STAGE IS 1504.3

MAXIMUM STAGE IS 1505.6

MAXIMUM STAGE IS 1506.9

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 2-3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0450	0.0400	0.0450	1445.0	1500.0	3600.	0.01390

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 1500.00 200.00 1480.00 400.50 1450.00 418.00 1445.00 438.00 1445.00
455.50 1450.00 800.00 1480.00 880.00 1500.00

STORAGE	0.00	7.21	19.55	42.43	77.88	125.91	186.53	259.72	345.49	441.84
	554.77	678.27	814.36	961.84	1119.02	1285.89	1462.46	1648.73	1844.68	2051.34
OUTFLOW	0.00	632.77	2606.88	6939.01	14390.50	25749.87	41764.11	63086.57	90335.70	124096.34

OK, SEG #HEC1DB

	164935.16	213384.84	269967.25	337807.81	414946.56	501313.69	597132.13	702643.13	818101.75	943769.88
STAGE	1445.00	1447.89	1450.79	1453.68	1456.58	1459.47	1462.37	1465.26	1468.16	1471.05
	1473.95	1476.84	1479.73	1482.63	1485.52	1488.42	1491.31	1494.21	1497.10	1500.00
FLOW	0.00	632.77	2606.88	6939.01	14380.50	25749.07	41764.11	63086.57	90335.70	124098.34
	164935.16	213384.84	269967.25	337807.81	414946.56	501313.69	597132.13	702643.13	818101.75	943769.88

MAXIMUM STAGE IS 1445.5

MAXIMUM STAGE IS 1451.3

MAXIMUM STAGE IS 1452.5

MAXIMUM STAGE IS 1453.7

MAXIMUM STAGE IS 1455.0

MAXIMUM STAGE IS 1456.2

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 3-4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRE	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0450	0.0400	0.0450	1426.0	1480.0	1100.	0.01100

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 1480.00 450.00 1440.00 725.00 1431.00 742.50 1426.00 762.50 1426.00
780.00 1431.00 1010.00 1440.00 1300.00 1480.00

STORAGE	0.00	2.15	6.02	18.44	42.31	77.60	119.96	166.09	215.99	266.67
	327.12	388.34	453.34	522.11	594.65	670.97	751.06	834.93	922.56	1013.97
OUTFLOW	0.00	543.84	2235.41	7096.47	17994.19	37541.90	69546.19	110925.36	161624.59	221759.97
	291533.75	371196.56	461026.63	561318.88	672379.00	794517.38	928049.13	1073288.50	1230552.25	1401154.00
STAGE	1426.00	1428.84	1431.68	1434.53	1437.37	1440.21	1443.05	1445.89	1448.74	1451.58
	1454.42	1457.26	1460.10	1462.95	1465.79	1468.63	1471.47	1474.31	1477.16	1480.00

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FLOW	0.00	543.84	2235.41	7096.47	17994.19	37541.90	69546.19	110925.36	161624.59	221759.97
	291533.75	371196.56	461026.63	561318.88	672379.00	794517.38	928049.13	1073288.50	1230 52.25	1410154.00

MAXIMUM STAGE IS 1426.5

MAXIMUM STAGE IS 1432.3

MAXIMUM STAGE IS 1433.4

MAXIMUM STAGE IS 1434.4

MAXIMUM STAGE IS 1435.3

MAXIMUM STAGE IS 1436.2

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 4-5

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	FLNVT	ELMAX	RLNTH	SEL
0.0450	0.0450	0.0450	1390.0	1450.0	2600.	0.01400

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1450.00 610.00 1420.00 872.50 1395.00 890.00 1390.00 910.00 1390.00
927.50 1395.00 1700.00 1420.00 2350.00 1450.00

STORAGE	0.00	5.85	17.65	50.60	108.19	198.42	297.29	428.79	584.94	765.73
	971.20	1201.62	1457.04	1737.46	2042.87	2373.28	2728.69	3109.09	3514.49	3944.88
OUTFLOW	0.00	748.85	3277.06	10214.29	24566.96	48847.48	85245.94	135757.44	202239.41	286443.81
	390058.44	515428.06	663988.00	837017.88	1035859.25	1261867.75	1516389.75	1800754.50	2116272.00	2464230.00
STAGE	1390.00	1393.16	1396.32	1399.47	1402.63	1405.79	1408.95	1412.10	1415.26	1418.42
	1421.58	1424.73	1427.89	1431.05	1434.21	1437.37	1440.52	1443.68	1446.84	1450.00
FLOW	0.00	748.85	3277.06	10214.29	24566.96	48847.48	85245.94	135757.44	202239.41	286443.81
	390058.44	515428.06	663988.00	837017.88	1035859.25	1261867.75	1516389.75	1800754.50	2116272.00	2464230.00

MAXIMUM STAGE IS 1390.4

MAXIMUM STAGE IS 1396.3

MAXIMUP STAGE IS 1397.2

MAXIMUM STAGE IS 1398.0

MAXIMUM STAGE IS 1399.5

MAXIMUM STAGE IS 1400.2

SUB-AREA RUNOFF COMPUTATION

CALCULATION OF INFLOW HYDROGRAPH TO DAM NY557 DOWNSTREAM OF DAM NY593

	ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
INFLOW		0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	LUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	5.60	0.00	13.60	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.70	114.00	124.00	138.00	148.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.811

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.60	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 3.09 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= 2.00 QRCSN= -0.10 RTIOR= 2.00

UNIT HYDROGRAPH 67 END-OF-PERIOD ORDINATES, LAG= 3.06 HOURS, CP= 0.63 VOL= 1.00

18.	66.	134.	214.	301.	393.	489.	579.	653.	709.
746.	765.	762.	729.	672.	615.	562.	515.	471.	431.
394.	360.	330.	302.	276.	252.	231.	211.	193.	177.
162.	148.	135.	124.	113.	104.	95.	87.	79.	73.
66.	61.	56.	51.	47.	43.	39.	36.	33.	30.
27.	25.	23.	21.	19.	17.	16.	15.	13.	12.
11.	10.	9.	9.	8.	7.	7.			

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	27.23	23.47	3.76	304033.
										(692.)(596.)(95.)(8609.25)			

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COMBINE HYDROGRAPHS

COMBINE OUTFLOW FROM DAM NY593 WITH UNREGULATED RUNOFF TO DAM NY557

	ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
OMBINE		2	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

CALCULATION OF OUTFLOW HYDROGRAPH FROM DAM NY557

	ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
UTFLOW		1	0	0	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPPP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1393.	-1

STAGE	1392.70	1398.00	1403.00	1408.00	1413.00	1414.00	1415.00	1416.00	1417.00	1418.00
	1419.00	1420.00	1421.00	1422.00	1423.00					
FLOW	0.00	128.00	178.00	217.00	258.00	1583.00	4035.00	7229.00	11024.00	15406.00
	20221.00	25576.00	31286.00	37395.00	44022.00					
SURFACE AREA=	14.	19.	34.	45.	63.	71.	81.	102.		
CAPACITY=	0.	38.	168.	364.	632.	833.	1031.	1579.		
ELEVATION=	1393.	1395.	1400.	1405.	1410.	1413.	1416.	1422.		

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1413.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1421.6	2.7	1.5	1580.

PEAK OUTFLOW IS 1302. AT TIME 45.75 HOURS

PEAK OUTFLOW IS 5106. AT TIME 46.50 HOURS

PEAK OUTFLOW IS 8145. AT TIME 45.50 HOURS

PEAK OUTFLOW IS 11225. AT TIME 45.00 HOURS

PEAK OUTFLOW IS 16990. AT TIME 44.50 HOURS

PEAK OUTFLOW IS 22517. AT TIME 44.00 HOURS

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS RESERVOIR -1

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPPP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0400	0.0400	0.0400	1370.0	1420.0	1910.	0.00520

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 1420.00 675.00 1380.00 945.00 1375.00 562.50 1370.00 987.50 1378.00
1005.00 1375.00 1210.00 1380.00 1910.00 1420.00

STORAGE	0.00	2.91	7.49	25.38	64.28	115.24	173.98	240.27	314.34	396.12
	485.60	582.78	687.67	800.26	920.56	1048.56	1184.26	1327.67	1478.79	1637.61
OUTFLOW	0.00	388.76	1473.69	4988.87	14175.40	31709.06	56476.19	88743.86	128904.09	177393.84
	234666.41	301178.88	377387.86	463742.80	560689.13	668667.38	788109.88	919442.38	1063084.75	1219451.75
STAGE	1370.00	1372.63	1375.26	1377.89	1380.53	1383.16	1385.79	1388.42	1391.05	1393.68
	1396.31	1398.94	1401.58	1404.21	1406.84	1409.47	1412.10	1414.73	1417.36	1420.00
FLOW	0.00	388.76	1473.69	4988.87	14175.40	31709.06	56476.19	88743.86	128904.09	177393.84
	234666.41	301178.88	377387.86	463742.80	560689.13	668667.38	788109.88	919442.38	1063084.75	1219451.75

MAXIMUM STAGE IS 1374.9

MAXIMUM STAGE IS 1378.0

MAXIMUM STAGE IS 1378.8

MAXIMUM STAGE IS 1379.7

MAXIMUM STAGE IS 1380.9

MAXIMUM STAGE IS 1381.8

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 1-2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0400	0.0400	0.0400	1338.0	1380.0	2800.	0.01100

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 1380.00 450.00 1360.00 1270.00 1343.00 1287.50 1338.00 1312.50 1338.00
1330.00 1343.00 2075.00 1360.00 2150.00 1380.00

STORAGE	0.00	4.65	11.59	27.83	72.15	145.38	247.53	378.59	536.56	721.44
	945.22	1180.62	1424.27	1676.16	1936.29	2204.67	2481.38	2766.16	3059.28	3360.63
OUTFLOW	0.00	412.26	1495.43	3989.35	10563.11	23777.75	45731.69	78276.28	123105.59	181800.22
	256484.91	359938.63	478886.56	613014.38	762135.13	926148.63	1105016.00	1298743.50	1507373.50	1730972.25
STAGE	1338.00	1340.21	1342.42	1344.63	1346.84	1349.05	1351.26	1353.47	1355.68	1357.89
	1360.10	1362.31	1364.53	1366.74	1368.95	1371.16	1373.37	1375.58	1377.79	1380.00
FLOW	0.00	412.26	1495.43	3989.35	10563.11	23777.75	45731.69	78276.28	123105.59	181800.22
	256484.91	359938.63	478886.56	613014.38	762135.13	926148.63	1105016.00	1298743.50	1507373.50	1730972.25

MAXIMUM STAGE IS 1342.0

MAXIMUM STAGE IS 1345.0

MAXIMUM STAGE IS 1346.0

MAXIMUM STAGE IS 1346.9

MAXIMUM STAGE IS 1347.9

MAXIMUM STAGE IS 1348.8

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 2-3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

OK, SEG #REC1DB

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPRP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0400	0.0400	0.0400	1322.0	1380.0	1600.	0.01000

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1380.00 610.00 1360.00 960.00 1327.00 997.50 1322.00 1022.50 1322.00
1040.00 1327.00 1910.00 1360.00 2010.00 1380.00

STORAGE	0.00	4.00	11.08	28.90	59.57	103.18	159.58	228.75	310.86	405.84
	513.67	634.36	767.92	914.23	1072.75	1243.43	1426.26	1621.24	1828.37	2047.64
OUTFLOW	0.00	788.33	2905.18	8575.00	20078.87	39385.52	68249.00	108239.00	160818.41	227371.00
	309208.94	407595.19	523741.31	660583.38	822079.50	1007481.25	1216635.75	1450222.75	1708774.50	1992991.25
STAGE	1322.00	1325.05	1328.10	1331.16	1334.21	1337.26	1340.31	1343.37	1346.42	1349.47
	1352.52	1355.58	1358.63	1361.68	1364.73	1367.79	1370.84	1373.89	1376.94	1380.00
FLOW	0.00	708.33	2905.18	8575.00	20078.87	39385.52	68249.00	108239.00	160818.41	227371.00
	309208.94	407595.19	523741.31	660583.38	822079.50	1007481.25	1216635.75	1450222.75	1708774.50	1992991.25

MAXIMUM STAGE IS 1325.9

MAXIMUM STAGE IS 1329.3

MAXIMUM STAGE IS 1330.9

MAXIMUM STAGE IS 1331.9

MAXIMUM STAGE IS 1333.4

MAXIMUM STAGE IS 1334.6

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 3-4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPRP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0600	0.0500	0.0600	1310.0	1325.0	2100.	0.00280

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1325.00 250.00 1320.00 275.00 1317.00 282.50 1310.00 317.50 1310.00
325.00 1317.00 350.00 1320.00 600.00 1325.00

STORAGE	0.00	1.36	2.79	4.29	5.84	7.46	9.15	10.90	12.71	14.60
	16.82	19.53	22.75	26.61	32.91	42.22	54.52	69.83	88.15	109.46
OUTFLOW	0.00	31.35	99.42	195.44	316.10	459.59	624.79	811.84	1017.89	1249.60
	1537.05	1861.84	2231.11	2629.61	3110.50	3748.80	4577.01	5638.21	6941.47	8541.86
STAGE	1310.00	1310.79	1311.58	1312.37	1313.16	1313.95	1314.74	1315.53	1316.31	1317.10
	1317.89	1318.68	1319.47	1320.26	1321.05	1321.84	1322.63	1323.42	1324.21	1325.00
FLOW	0.00	31.35	99.42	195.44	316.10	459.59	624.79	811.84	1017.89	1249.60
	1537.05	1861.84	2231.11	2629.61	3110.50	3748.80	4577.01	5638.21	6941.47	8541.86

MAXIMUM STAGE IS 1317.2

MAXIMUM STAGE IS 1323.0

MAXIMUM STAGE IS 1324.8

MAXIMUM STAGE IS 1326.3

MAXIMUM STAGE IS 1329.1

MAXIMUM STAGE IS 1331.8

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 4-5

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	1	0	3	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0600	0.0500	0.0600	1306.0	1320.0	2400.	0.00000

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1320.00 1865.00 1311.00 1875.00 1306.00 1925.00 1306.00 1935.00 1311.00
2800.00 1320.00 3500.00 1320.00 3600.00 1320.00

STORAGE	0.00	2.09	4.30	6.63	9.08	11.64	14.33	17.35	26.67	41.86
	72.53	109.07	154.68	209.37	273.13	345.96	427.87	518.84	618.90	728.02
OUTFLOW	0.00	84.85	272.13	540.45	882.15	1293.25	1771.41	1976.46	2880.27	3129.81
	5125.58	8228.97	12617.91	18467.09	25944.46	35211.06	46421.59	59725.18	75265.88	93183.41
STAGE	1306.00	1306.74	1307.47	1308.21	1308.95	1309.68	1310.42	1311.16	1311.89	1312.63
	1313.37	1314.10	1314.84	1315.58	1316.32	1317.05	1317.79	1318.53	1319.26	1320.00
FLOW	0.00	84.85	272.13	540.45	882.15	1293.25	1771.41	1976.46	2880.27	3129.81
	5125.58	8228.97	12617.91	18467.09	25944.46	35211.06	46421.59	59725.18	75265.88	93183.41

MAXIMUM STAGE IS 1309.7

MAXIMUM STAGE IS 1313.3

MAXIMUM STAGE IS 1314.1

MAXIMUM STAGE IS 1314.6

MAXIMUM STAGE IS 1315.4

MAXIMUM STAGE IS 1316.0

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 5-6

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0400	0.0500	0.0400	1283.0	1320.0	1000.	0.00720

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1320.00 150.00 1300.00 1300.00 1290.00 2865.00 1283.00 2885.00 1283.00
3300.00 1300.00 3600.00 1320.00 3700.00 1320.00

STORAGE	0.00	21.04	80.93	179.68	315.89	476.95	659.86	864.60	1091.20	1338.97
	1595.15	1854.86	2118.09	2384.84	2655.13	2928.93	3206.27	3487.13	3771.51	4059.42
OUTFLOW	0.00	1297.83	7826.16	22668.88	50823.84	95434.25	154879.66	227734.50	317360.94	417151.00
	563130.88	716049.25	885268.25	1070301.50	1270771.00	1486374.00	1716867.00	1962048.50	2221755.50	2495854.00
STAGE	1283.00	1284.95	1286.89	1288.84	1290.79	1292.74	1294.68	1296.63	1298.58	1300.53
	1302.47	1304.42	1306.37	1308.31	1310.26	1312.21	1314.16	1316.10	1318.05	1320.00
FLOW	0.00	1297.83	7826.16	22668.88	50823.84	95434.25	154879.66	227734.50	317360.94	417151.00
	563130.88	716049.25	885268.25	1070301.50	1270771.00	1486374.00	1716867.00	1962048.50	2221755.50	2495854.00

MAXIMUM STAGE IS 1284.9

MAXIMUM STAGE IS 1286.1

MAXIMUM STAGE IS 1286.9

MAXIMUM STAGE IS 1287.3

MAXIMUM STAGE IS 1288.1

MAXIMUM STAGE IS 1288.8

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1

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6
				RATIOS APPLIED TO FLOWS					
				0.20	0.40	0.50	0.60	0.80	1.00
HYDROGRAPH AT	INFLOW	8.00	1	2906.	5812.	7265.	8718.	11623.	14529.
	(	20.72)	(	82.29)(	164.57)(	205.71)(	246.86)(	329.14)(	411.42)(
ROUTED TO	OUTFLOW	8.00	1	103.	3346.	5208.	6964.	10275.	13395.
	(	20.72)	(	2.92)(	94.74)(	147.47)(	197.19)(	290.95)(	379.31)(
ROUTED TO	1	8.00	1	103.	3338.	5194.	6951.	10247.	13363.
	(	20.72)	(	2.92)(	94.53)(	147.07)(	196.82)(	290.17)(	378.41)(
ROUTED TO	2	8.00	1	103.	3334.	5193.	6953.	10254.	13370.

		(20.72)	(2.92)(	94.42)(	147.85)(	196.88)(	298.37)(	378.60)(
ROUTED TO	3	8.00	1	103.	3337.	5187.	6951.	10254.	13372.
		(20.72)	(2.91)(	94.49)(	146.88)(	196.82)(	290.36)(	378.66)(
ROUTED TO	4	8.00	1	103.	3336.	5183.	6944.	10254.	13374.
		(20.72)	(2.91)(	94.46)(	146.77)(	196.63)(	290.35)(	378.70)(
ROUTED TO	5	8.00	1	103.	3335.	5185.	6938.	10248.	13363.
		(20.72)	(2.91)(	94.44)(	146.82)(	196.47)(	289.96)(	378.41)(
HYDROGRAPH AT	INFLOW	5.60	1	2355.	4711.	5889.	7066.	9422.	11777.
		(14.50)	(66.70)(	133.40)(	166.75)(	200.09)(	266.79)(	333.49)(
2 COMBINED	OMBINE	13.60	1	2436.	5159.	8217.	11344.	17091.	22617.
		(35.22)	(68.97)(	146.09)(	232.67)(	321.21)(	483.97)(	640.43)(
ROUTED TO	OUTFLOW	13.60	1	1302.	5106.	8145.	11225.	16998.	22517.
		(35.22)	(36.87)(	144.58)(	230.65)(	317.85)(	481.11)(	637.60)(
ROUTED TO	1	13.60	1	1304.	5100.	8141.	11218.	16996.	22501.
		(35.22)	(36.93)(	144.40)(	230.54)(	317.42)(	481.27)(	637.15)(
ROUTED TO	2	13.60	1	1304.	5099.	8144.	11202.	16993.	22510.
		(35.22)	(36.93)(	144.39)(	230.61)(	317.21)(	481.19)(	637.41)(
ROUTED TO	3	13.60	1	1307.	5101.	8143.	11207.	16988.	22511.
		(35.22)	(37.02)(	144.44)(	230.59)(	317.34)(	481.04)(	637.44)(
ROUTED TO	4	13.60	1	1300.	5080.	8117.	11152.	16544.	22435.
		(35.22)	(36.83)(	143.86)(	229.84)(	315.79)(	479.81)(	635.28)(
ROUTED TO	5	13.60	1	1302.	5069.	8096.	11149.	16911.	22442.
		(35.22)	(36.85)(	143.53)(	229.26)(	315.70)(	478.86)(	635.49)(
ROUTED TO	6	13.60	1	1287.	5063.	8090.	11130.	16903.	22418.
		(35.22)	(36.45)(	143.38)(	229.10)(	315.17)(	478.64)(	634.82)(

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1554.50	1578.00	1587.00
STORAGE	0.	1960.	3829.
OUTFLOW	0.	109.	24698.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	1575.21	0.00	1543.	103.	0.00	48.00	0.00
0.40	1580.36	0.00	2376.	3346.	0.00	46.50	0.00
0.50	1581.20	0.00	2538.	5209.	0.00	45.50	0.00
0.60	1581.90	0.00	2676.	6964.	0.00	45.00	0.00
0.80	1583.07	0.00	2920.	10275.	0.00	44.50	0.00
1.00	1584.04	0.00	3130.	13395.	0.00	44.25	0.00

OK, SEG #HEC1DB

PLAN 1 STATION 1

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	103.	1538.4	48.00
0.40	3338.	1546.6	46.50
0.50	5194.	1548.7	45.75
0.60	6951.	1549.8	45.25
0.80	10247.	1552.0	44.75
1.00	13363.	1553.4	44.25

PLAN 1 STATION 2

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	103.	1495.4	48.00
0.40	3334.	1501.4	46.75
0.50	5193.	1503.1	45.75
0.60	6953.	1504.3	45.25
0.80	10254.	1505.6	44.75
1.00	13378.	1506.9	44.50

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	103.	1445.5	48.00
0.40	3337.	1451.3	46.75
0.50	5187.	1452.5	45.75
0.60	6951.	1453.7	45.25
0.80	10254.	1455.0	44.75
1.00	13372.	1456.2	44.50

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	103.	1426.5	48.00
0.40	3336.	1432.3	46.75
0.50	5183.	1433.4	45.75
0.60	6944.	1434.4	45.25
0.80	10254.	1435.3	44.75
1.00	13374.	1436.2	44.50

PLAN 1 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	103.	1390.4	48.00
0.40	3335.	1396.3	46.75
0.50	5185.	1397.2	46.00
0.60	6938.	1398.0	45.50

0.80	10240.	1399.5	44.75
1.00	13363.	1400.2	44.50

SUMMARY OF DAM SAFETY ANALYSIS

1

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1392.70	1413.00	1421.60
STORAGE	0.	833.	1579.
OUTFLOW	0.	250.	34951.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	1413.79	0.00	898.	1302.	0.00	45.75	0.00
0.40	1415.33	0.00	1009.	5106.	0.00	46.50	0.00
0.50	1416.24	0.00	1083.	8145.	0.00	45.50	0.00
0.60	1417.05	0.00	1151.	11225.	0.00	45.00	0.00
0.80	1418.33	0.00	1264.	16990.	0.00	44.50	0.00
1.00	1419.43	0.00	1366.	22517.	0.00	44.00	0.00

PLAN 1 STATION 1

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	1304.	1374.9	45.75
0.40	5100.	1378.8	46.50
0.50	8141.	1378.8	45.75
0.60	11210.	1379.7	45.00
0.80	16996.	1380.9	44.50
1.00	22501.	1381.8	44.00

PLAN 1 STATION 2

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	1304.	1342.8	45.75
0.40	5099.	1345.8	46.75
0.50	8144.	1346.8	45.75
0.60	11202.	1346.9	45.25
0.80	16993.	1347.9	44.50
1.00	22510.	1348.8	44.25

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	1307.	1325.9	45.75
0.40	5101.	1329.3	46.75
0.50	8143.	1330.9	45.75
0.60	11207.	1331.9	45.25
0.80	16988.	1333.4	44.50
1.00	22511.	1334.6	44.25

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	1300.	1317.2	46.00
0.40	5080.	1323.0	47.00
0.50	8117.	1324.8	46.00
0.60	11152.	1326.3	45.25
0.80	16944.	1329.1	44.75
1.00	22435.	1331.8	44.50

PLAN 1 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	1302.	1309.7	46.00
0.40	5069.	1313.3	47.00
0.50	8096.	1314.1	46.00
0.60	11149.	1314.6	45.50
0.80	16911.	1315.4	44.75
1.00	22442.	1316.0	44.50

PLAN 1 STATION 6

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	1287.	1284.9	46.25
0.40	5063.	1286.1	47.25
0.50	8090.	1286.9	46.25
0.60	11130.	1287.3	45.58
0.80	16903.	1288.1	45.00
1.00	22418.	1288.8	44.50

1**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
****

DAM 557 CONEWANGO CREEK DAM REFR. QUAD. MAP RANDOPH, N.Y.
DRAINAGE AREA

DISTANCE L & Lca MEASURED WITH MAP MEASURE WHEEL (1" = 2000')

COMPUTATIONS FOR L DRAINAGE AREA

RUN	MEAS. DIST.	AVG. DIST.	COEF.	L DISTANCE
A	1 = 7"			
	2 = 7"			
	14"	÷ 2 = 14.0	× 2000' =	14000 FT
B	1 = 7.4			
	2 = 7.5			
	14.9	÷ 2 =	× 2000' =	14900 FT
C	1 = 8.2			
	2 = 8.3			
	16.5	÷ 2 = 8.25	× 2000'	16500 FT *

* L = 16500 FT (USED RUN C)

COMPUTATIONS FOR Lca DRAINAGE AREA

	MEAS. DIST.	AVG. DIST.	COEF.	Lca DISTANCE
RUN 1	3.4			
RUN 2	3.4			
	6.8	÷ 2 = 3.4	× 2000 =	6800 FT. *

* Lca = 6340 FT

$$\tau_p = C_t \, (L L_{ca})^{0.3} \quad , \qquad C_t = 2.00$$

$$C_p = 0.63$$

$$\tau_r = \frac{\tau_p}{5.5}$$

$$\tau_{pR} = \tau_p + 0.25 (\tau_R - \tau_r)$$

$L = 16500 \text{ ft} = 3.13 \text{ mi}$

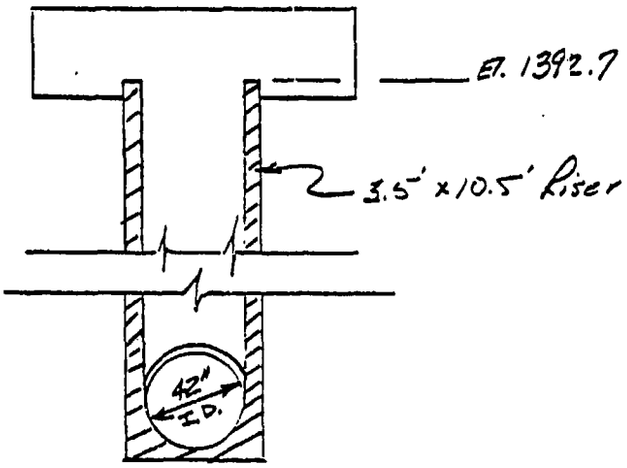
$L_{ca} = 6340 \text{ ft} = 1.20 \text{ mi}$

$\tau_p = 2.0 (3.13 \times 1.20)^{0.3} = 2.97 \text{ hr.}$ ✓

$\tau_r = \frac{2.97}{5.5} = 0.54 \text{ hr.} \Rightarrow \tau_R = 1.0 \text{ hr.}$

$\tau_{pR} = 2.97 + 0.25 (1.0 - 0.54) = 3.09 \text{ hr.}$ ✓

Service Spillway



Assume that the 42" RCP is the control & develop an eqtn. of the form $Q = CA\sqrt{2gH}$ to describe the flow.

From the Design Report

Q_s = 0 cfs @ El. 1392.7 ✓

Q_s = 249 cfs @ El. 1413.0 ✓

$$Q_s = C_o A_o \sqrt{2g H_o}$$

$$A_o = \pi (1.75')^2 = 9.6 ft^2 \checkmark$$

Determine C_o from Q_s = 249 cfs and 0 cfs

$$H_o = 1413.0 - 1392.7 = 20.3'$$

$$C_o = \frac{Q_s}{A_o \sqrt{2g H_o}} = \frac{249 cfs}{9.6 ft^2 \sqrt{2(32.2)(20.3)}} = 0.72 \checkmark$$

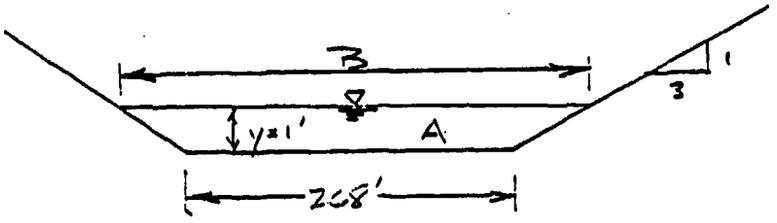
$$Q_s = 0.72(9.6 ft^2)\sqrt{2(32.2)}\, H_o^{0.5} = 55.47 H_o^{0.5} \checkmark$$

Elev.	H_o	Q_s	Elev.	H_o	Q_s
1398.0	5.3	128 ✓	1417.0	24.3	273 ✓
1403.0	10.3	178 ✓	1418.0	25.3	279 ✓
1408.0	15.3	217 ✓	1419.0	26.3	284 ✓
1413.0	20.3	250 ✓	1420.0	27.3	290 ✓
1414.0	21.3	256 ✓	1421.0	28.3	295 ✓
1415.0	22.3	262 ✓	1422.0	29.3	300 ✓
1416.0	23.3	268 ✓	1423.0	30.3	305 ✓

for Elev. 1421.6
H_o = 28.9, Q_s = 298 cfs

for Elev. 1419.2
H_o = 26.5, Q_s = 286 cfs

Critical depth & supercritical flow calc. for E. Emergency Spillway



Critical depth flow $\frac{Q_c^2}{g} = \frac{A^3}{B} \Rightarrow Q_c = \sqrt{\frac{gA^3}{B}}$

For $y = 1'$

$A = 268'(1') + 2(\frac{1}{2} \times 3' \times 1') = 271\ ft^2$

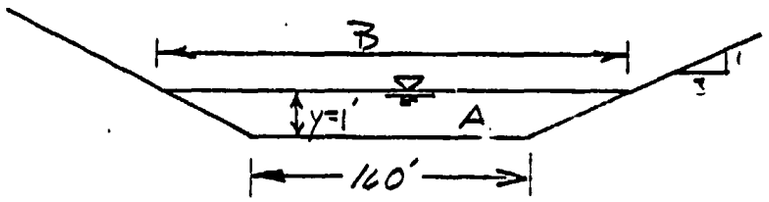
$B = 268' + 2(3 \times 1') = 274\ ft$

$Q_c = \sqrt{\frac{32.2(271\ ft^2)^3}{274}} = 1529\ cfs$

$K = \frac{1.49}{n} AR^{2/3} = \frac{1.49}{0.03}(271\ ft^2)\left(\frac{271\ ft^2}{274.32}\right)^{2/3} = 13,351$

$S_c = \left(\frac{Q_c}{K}\right)^2 = \left(\frac{1529\ cfs}{13,351}\right)^2 = 0.013$

Critical depth & supercritical flow calc. for W. Emergency Spillway



Critical depth flow $\frac{Q_c^2}{g} = \frac{A^3}{B} \Rightarrow Q_c = \sqrt{\frac{g A^3}{B}}$

For $y = 1'$

$A = 160'(1') + 2(\frac{1}{2} \times 3' \times 1') = 163\ ft^2$

$B = 160' + 2(3 \times 1') = 166\ ft$

$Q_c = \sqrt{\frac{32.2(163)^3}{166}} = 916\ cfs.$

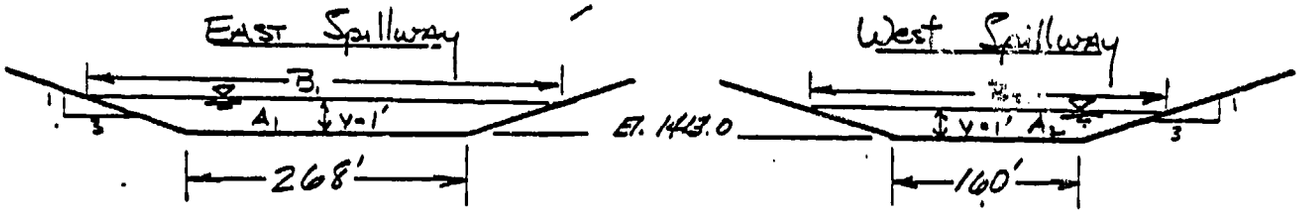
$K = \frac{1.49}{n} AR^{2/3} = \frac{1.49}{0.030}(163\ ft^2)\left(\frac{163}{166.32}\right)^{2/3} = 7,988$

$S_c = \left(\frac{Q_c}{K}\right)^2 = \left(\frac{916\ cfs}{7,988}\right)^2 = 0.013$

Emergency Spillway

Ref: "Brater & King" Table 8-7 pg. 8-59
"Determining the discharge Q of a trapezoidal Channel when Flow is at Critical Depth"

Check to see if flow passes through critical depth. Determine critical slope for a flow depth of y = 1'. If Spillway slope > critical slope, flows pass through the critical depth and Table 8-7 holds.



East & West $S_o = 0.028$ ft/ft

Critical depth flow $\frac{Q_c^2}{g} = \frac{A_3^3}{B_3}$ $\quad Q_c = \sqrt{\frac{g A_3^3}{B_3}}$

For y = 1'

$A_3 = A_1 + A_2 = 268'(1') + 2(\frac{1}{2} \times 3' \times 1) + 160'(1') + 2(\frac{1}{2} \times 3' \times 1')$

$A_3 = 434\ ft^2$

$B_3 = B_1 + B_2 = 268' + 2(3 \times 1') + 160' + 2(3 \times 1')$

$B_3 = 440\ ft$

$$Q_c = \sqrt{\frac{32.2(434\ ft^2)^3}{440}} = 2446\ cfs$$

$$K = \frac{1.49}{n} AR^{2/3} = \frac{1.49}{0.030}(434\ ft^2)\left(\frac{434\ ft^2}{440.65\ ft}\right)^{2/3} = 21,338$$

$n = 0.030$ for Earth, fairly uniform section, grass, some weeds

$$S_c = \left(\frac{Q_s}{K}\right)^2 = \left(\frac{2446\ cfs}{21,338}\right)^2 = 0.013$$

Spillway slope > critical slope ∴
0.028 > 0.013

- flow passes through the critical depth for $y = 1'$ and also for $y > 1'$ ∴ Use Table E-7

$z = 3/1 = 3.0$ ✓
$b = 428\ ft$ ✓

Elev.	H_m	H_m^2/b	C_2	Q_E
1413.0	0	0	0	0
1414.0	1.0	.007	3.10	1,327 ✓
1415.0	2.0	.014	3.12	3,777 ✓
1416.0	3.0	.021	3.13	6,961 ✓
1417.0	4.0	.028	3.14	10,751 ✓
1418.0	5.0	.035	3.16	15,121 ✓
1419.0	6.0	.042	3.17	19,940 ✓
1420.0	7.0	.049	3.19	25,286 ✓
1421.0	8.0	.056	3.20	30,991 ✓
1422.0	9.0	.063	3.21	37,095 ✓
1423.0	10.0	.070	3.23	43,717 ✓

$$Q_E = C_2\, b\, H_m^{1.5}$$

@ elev. 1421.6 $H_m = 8.6$ ft. $\frac{H_m^2}{b} = 0.0603$
$C_2 = 3.20$, $Q_E = 34,542$ cfs.

@ elev 1419.2 $H_m = 6.2$ ft $\frac{H_m^2}{b} = 0.0435$
$C_2 = 3.17$ $Q_E = 20,945$ cfs

CONEWANGO CREEK DAM SITE 16 A

$A RAREA = RESERVOIR SURFACE AREA in ACRES
$E RELEV = RESERVOIR ELEVATION in FEET

REFF. U.S. DEPT. A.S.C.A. AS BUILT PLANS DWG.
" " " DESIGN REPORT SHEET 4

SCALE 1" = 200' (1/2 REDUCTION 1" = 400')

Eq. $in^2 \times \frac{(400\,ft)^2}{in^2} \times \frac{1\,AC}{43560\,ft^2} = Ac.$

ELEV. 1392.7 = 14.4 Ac. GIVEN

ELEV. 1395.0 = $5.19\,in^2 \times \frac{(400\,ft)^2}{in^2} \times \frac{1\,AC}{43560\,ft^2} = 19.06\,Ac.$ ✓

ELEV. = 1400 = $9.14\,in^2 \times \frac{(400\,ft)^2}{in^2} \times \frac{1\,AC}{43560\,ft^2} = 33.57\,Ac.$ ✓

ELEV. = 1405 = $12.28\,in^2 \times \frac{(400\,ft)^2}{in^2} \times \frac{1\,AC}{43560\,ft^2} = 45.10\,Ac.$ ✓

ELEV = 1410 = $17.01\,in^2 \times \frac{(400\,ft)^2}{in^2} \times \frac{1\,AC}{43560\,ft^2} = 62.48\,Ac.$ ✓

ELEV. = 1413.0 = 71.3 Ac. GIVEN

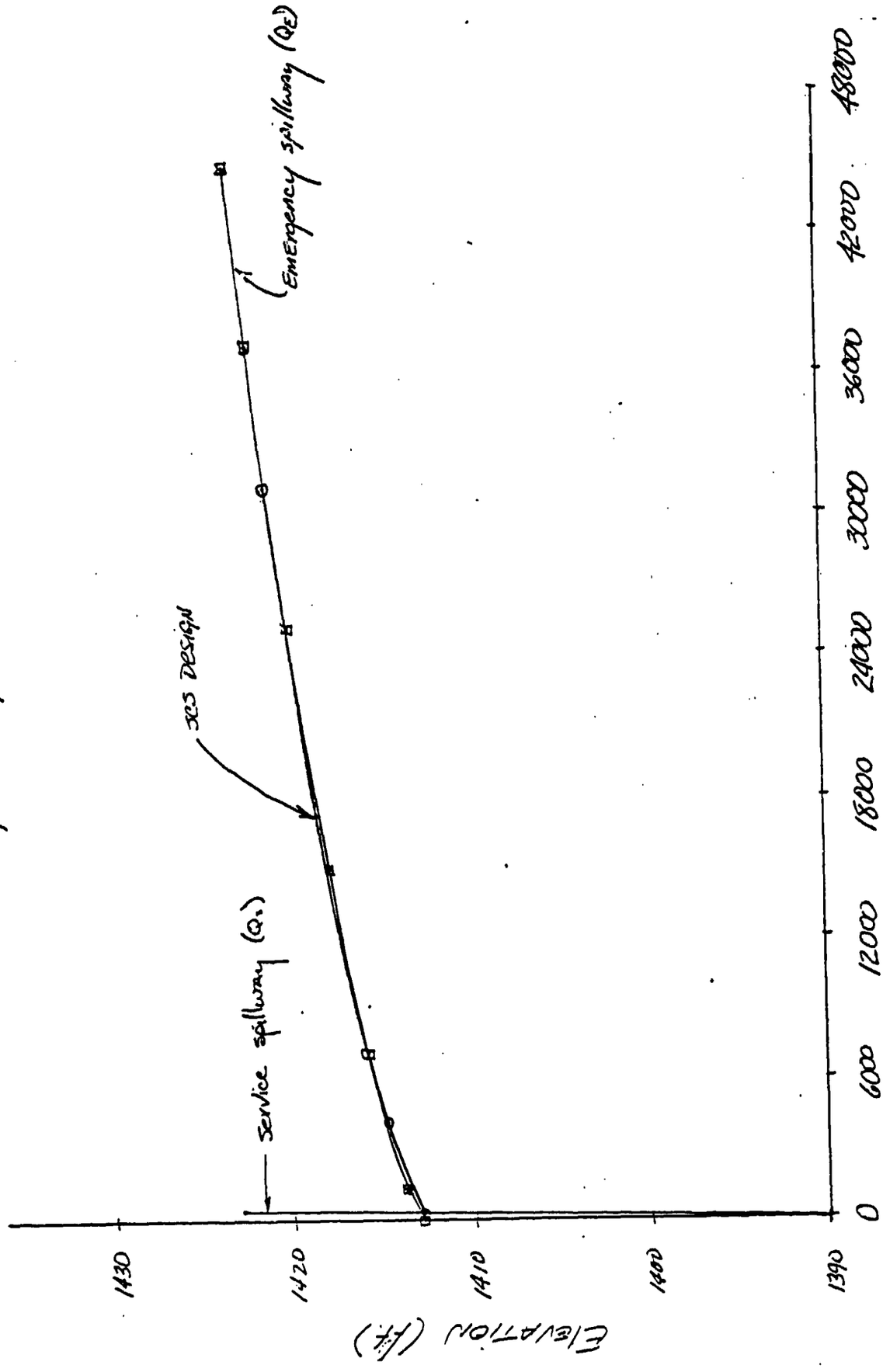
ELEV. 1415.6 = 81.0 Ac. GIVEN

ELEV. 1421.6 = 102.0 Ac. GIVEN

Total Spillway Discharges ($Q_S + Q_E$)

Elev.	$Q_S + Q_E$	Reservoir Surface Area
1392.7	0	14.4
1395.0	—	19.1
1398.0	128	—
1400.0	—	33.6
1403.0	178	—
1405.0	—	45.1
1408.0	217	—
1410.0	—	62.5
1413.0	250	71.3
1414.0	1,583	—
1415.0	4,039	—
1415.6	—	81.0
1416.0	7,229	—
1417.0	11,024	—
1418.0	15,400	—
1419.0	20,224	—
1420.0	25,576	—
1421.0	31,286	—
1421.6	—	102.0
1422.0	37,395	—
1423.0	44,022	—

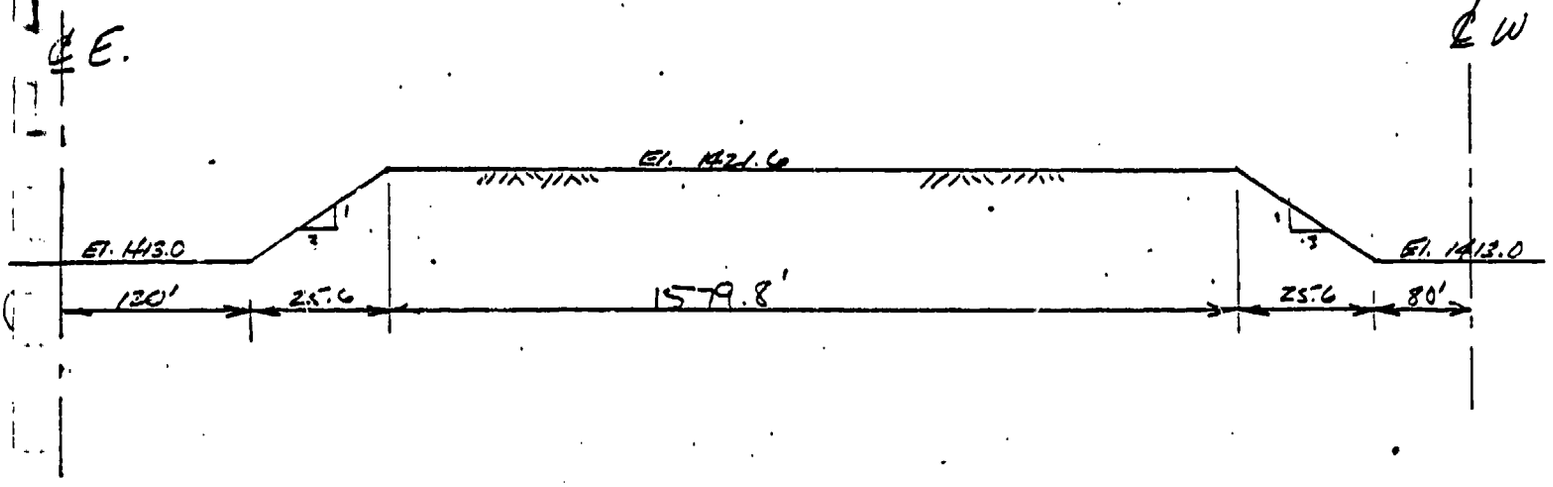
Spillway Rating Curve - Dam 557



DAM Crest Length

℄ EAST Emerg. Spillway sta. 2+48 ✓

℄ West Emerg. Spillway sta. 20+79 ✓



sta. 2+48
1+20
+ 25.6
3+93.6 ✓

sta 20+79
-80
-25.6
19+73.4 ✓

1973.4 − 393.6 = 1579.8' ✓

Overtopping DATA

DAM Height = 1421.6 ✓

Discharge Coefficient (C) = 2.7 ✓

Exponent (E) = 1.5 ✓

Emergency Spillway Capacities

Flood	Q_T	Elev.	Q_{ES}	A	V	Comments
PMF	22,517	1419.43	22,239	2096	10.6 ft/sec	>8 ft/sec ∴ erosion
1/2 PMF	8145	1416.24	7871	1062	7.4 ft/sec	<8 ft/sec ∴ no erosion

b = 42e'

PMF

Elev.	Q_{ES}
1419.0	19,940
1419.43	Q
1420.0	25,206
.43	5346

$$\frac{0.43}{1} = \frac{y}{5346} \qquad y = 2299 \qquad Q_{ES} = 22,239 \text{ cfs}$$

Since $y_n/b < 0.02$

$$*y_n = 0.789\left(\frac{Q\,n}{b\,S_o^{1/2}}\right)^{0.6} = 0.789\left(\frac{22{,}239\,(0.06)}{42e\,(0.02e)^{1/2}}\right)^{0.6} = 4.6 \text{ ft}$$

$$A = \tfrac{1}{2}\left(42e + [4.6(3.0)(4) + 42e]\right) \times 4.6 = 2096 \text{ ft}^2$$

$$V = \frac{Q}{A} = \frac{22239 \text{ cfs}}{2096 \text{ ft}^2} = 10.6 \text{ ft/sec}$$

1/2 PMF

Elev.	Q_{ES}
1416.0	6961
1416.24	Q
1417.0	10751
.24	3790

$$\frac{0.24}{1} = \frac{y}{3790} \qquad y = 909.6 \qquad Q = 7871 \text{ cfs}$$

Since $y_n/b < 0.02$

$$*y_n = 0.789\left(\frac{Q\,n}{b\,S_o^{1/2}}\right)^{0.6} = 0.789\left(\frac{7871\,(0.06)}{428\,(0.020)^{1/2}}\right)^{0.6} = \underline{2.4\ ft}$$ ✓

$$A = \tfrac{1}{2}\left(428 + [2.4(3.0)(4) + 428]\right) \times 2.4 = \underline{1062\ ft^2}$$ ✓

$$V = \frac{Q}{A} = \frac{7871\ cfs}{1062\ ft^2} = 7.4\ ft/sec$$ ✓

REF: Table 103E "Fundamentals Of Oper Channel Hydraulics" by C. Posey.

B.R. 4/14/81
K-RA 4/19/81

CONEWANGO CREEK DAM

DAM DATA FROM AS BUILT PLAN
DAM TOP ELEV. 1423.3'
DAM INV. ELEV. 1377.4'

$\frac{1420}{0}, \frac{1380}{675}, \frac{1375}{945}, \frac{1370}{962.5}, \frac{1370}{987.5}, \frac{1375}{1005}, \frac{1380}{1210}, \frac{1420}{1910}$ ✓

REACH 1 LENGTH = 1410' = L

CROSS SECT: $\frac{1420}{0}$ $\frac{1400}{325}$ $\frac{1380}{675}$ $\frac{1370}{846}$ $\frac{1370}{905}$ $\frac{1375}{923}$ 1375 $\frac{1370}{965}$ $\frac{1370}{985}$ $\frac{1380}{1210}$ $\frac{1420}{1910}$ $\frac{1400}{1750}$

(2 3 1 4 5 6 7 8; 900)

SLOPE: DAM INV. − REACH 1 INV. = h ÷ L = SLOPE
1377.4 − 1370 = 7.4 ÷ 1410 = 0.0052 ✓

REACH 2 LENGTH = 2800' = L

CROSS SECT: $\frac{1380}{0}$ $\frac{1360}{450}$ $\frac{1338}{1290}$ $\frac{1338}{1370}$ $\frac{1360}{2075}$ $\frac{1380}{2150}$

$\frac{1380}{0}, \frac{1360}{450}, \frac{1343}{1270}, \frac{1338}{1287.5}, \frac{1338}{1312.5}$ ✓, $\frac{1343}{1330}, \frac{1360}{2075}, \frac{1380}{2150}$

SLOPE: REACH 1 INV. − REACH 2 INV. = h ÷ L = SLOPE
1370 − 1338 = 32 ÷ 2800' = 0.011 ✓

REACH 3 LENGTH = 1600' = L $\frac{1380}{0}, \frac{1360}{610}, \frac{1327}{980}, \frac{1322}{997.5}$ ✓, $\frac{1322}{1022.5}, \frac{1327}{1040}, \frac{1360}{1910}, \frac{1380}{201}$

CROSS SECT: $\frac{1380}{0}$ $\frac{1360}{610}$ $\frac{1340}{650}$ $\frac{1322}{1000}$ $\frac{1322}{1020}$ $\frac{1340}{1530}$ $\frac{1360}{1910}$ $\frac{1380}{2010}$

SLOPE: REACH 2 INV − REACH 3 INV = h ÷ L = SLOPE
1338 − 1322 = 16' ÷ 1600' = 0.010

REACH 4 LENGTH = 2100' = L

CROSS SECT: $\frac{1340}{0}$ $\frac{1340}{0}$ $\frac{1320}{80}$ $\frac{1318}{110}$ $\frac{1320}{300}$ $\frac{1318}{290}$ $\frac{1318}{410}$ $\frac{1320}{1400}$ $\frac{1340}{1800}$

(1 2 3 4 5 6 7)

SLOPE: REACH 3 INV − REACH 4 INV = h ÷ L = SLOPE
1322 − 1318 = 4' ÷ 2100 = 0.002

CONTINUED ON SHEET 2

KRH 4/14/81

CONEWANGO CREEK DAM

REACH 5 LENGTH = 2400

	1	2	3	4	5	6	7	8
CROSS SECT.	1330 / 0	1320 / 200	1300 / 2500	1297 / 2640	1297 / 2660	1300 / 3125	1320 / 3500	1330 / 3600

SLOPE: REACH 4 INV. - REACH 5 INV. = h ÷ L = SLOPE

1318 - 1297 = 21 ÷ 2400 = 0.00875

REACH 6 LENGTH = 1800'

	1	2	3	4	5	6	7
CROSS SECT.	1320 / 0	1300 / 150	1290 / 1300	1283 / 1865	1283 / 2685	1300 / 3200	1320 / 3600

SLOPE: REACH 5 INV. - REACH 6 INV. = h ÷ L = SLOPE

1297 / 1306 - 1283 = 14 / 23 ÷ 1800 / 3200 = 0.0077 0.0072

1320/0, 1300/150, 1288/2840, 1283/2850, 1283/2900, 1288/2910, 1300/3300, 1320/3600

NEW SECTION 4 :

REACH 4 LENGTH = 1800

CROSS SECT. 1325/0, 1320/250, 1318/275, 1310/282.5, 1310/317.5, 1318/325, 1320/350, 132/60

slope : 1322 - 1310 = 12 ÷ 1800 = 0.0067

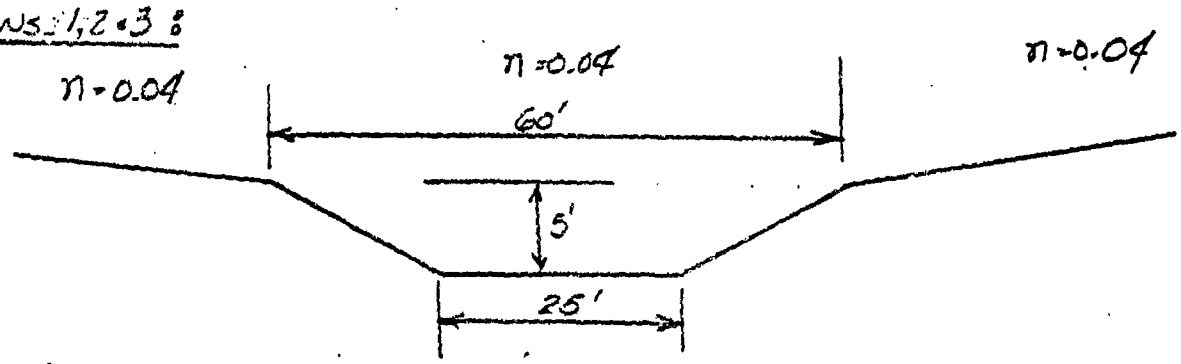
NEW SECTION 5 : 1320/0, 1311/1865, 1306/1875, 1306/1925, 1311/1935, 1320/2800

REACH LENGTH = 1400'

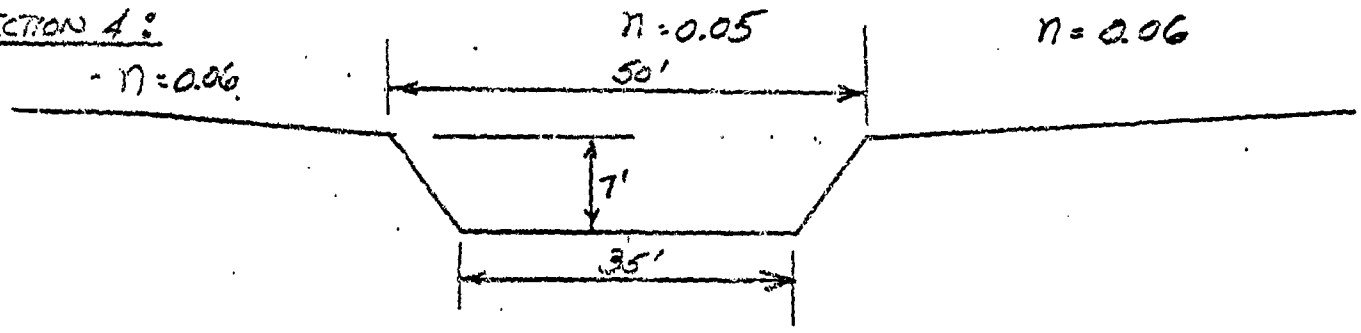
slope : 1310 - 1306 = 4 ÷ 1400 = 0.00286

DAM 557 - CHANNEL SECTIONS

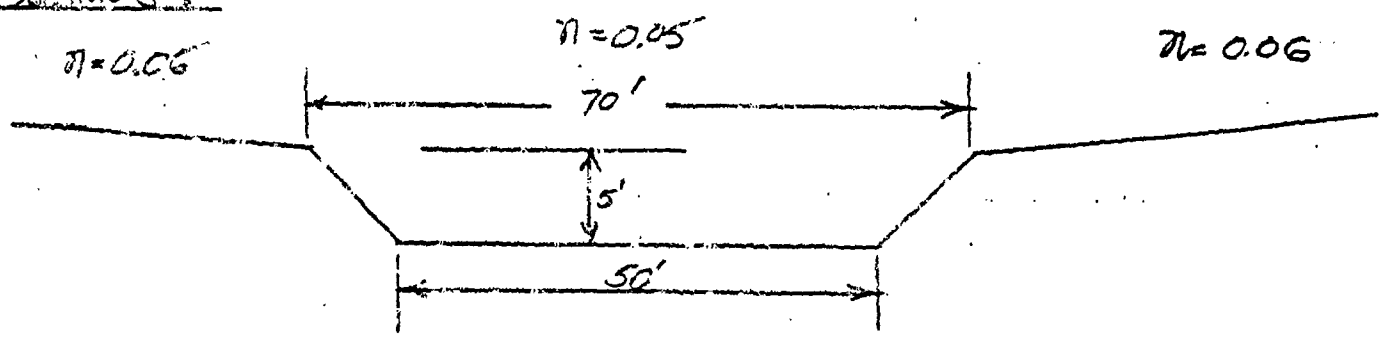
SECTIONS 1, 2 & 3 :



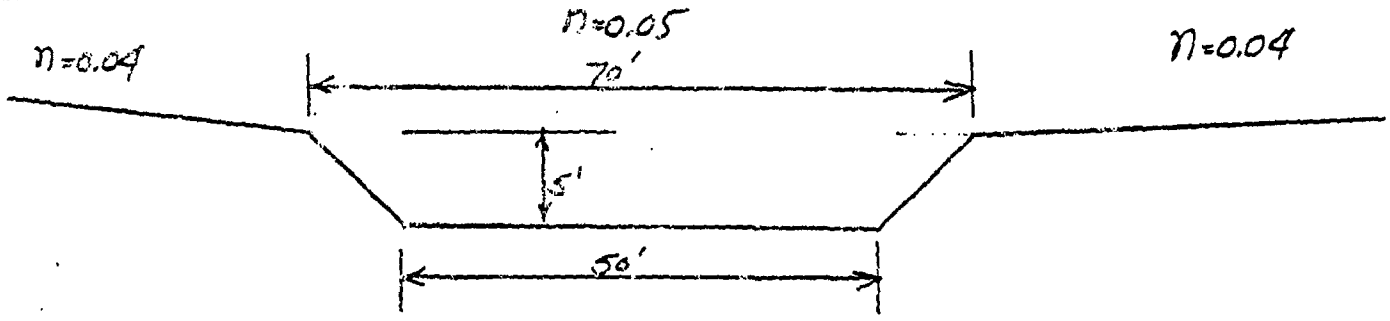
SECTION 4 :



SECTION 5 :



SECTION 6 :



APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS

80/11/18. PAGE 123

FORM 487A ITEM	NOMENCLATURE	DATA
1	ID	NY00557
2	DIVISION	NAD
3	STATE	33
4	COUNTY	009 (CATTARAUGUS)
5	CONGR. DIST.	39
6	2ND STATE	
7	2ND COUNTY	
8	2ND. CONGR	
9	OFF. DAM NAME	CONEWANGO CREEK DAM
10	LATITUDE	42-11.4
11	LONGITUDE	078-57.0
12	REPORT DATE	80/09/18.
13	POPULAR NAME	NONE
14	IMPOUND. NAME	UNKNOWN
15	REGION	05
16	BASIN.	01
17	RIVER/STREAM	ELM CREEK
18	D/S CITY-TOWN	EAST RANDOLPH
19	DISTANCE	002
20	POPULATION	00000379
21	TYPE OF DAM	RE
22	YEAR COMPLETED	1970
23	PURPOSES	C 44
24	STR. HEIGHT	~~0042~~
25	HYD. HEIGHT	~~0030~~ 35
26	MAX CAPACITY	~~00000890~~ 1514
27	NORMAL CAP.	~~00000052~~ 51
27A	CORPS DIST.	ORP
27B	OWNER CODE	N
27C	FED. REGULATED	N
27D	PVT. ON FED.	N
27E	SCS AID	N
27F	VERIFY DATE	80/09/25.
28	REMARK	1-10-18A-3870 ~~CONDUIT WITH 10.5'x3.5' RISER~~
56	REMARK	~~31-42INCH DROP INLET, 32-EMERGENCY, ONLY ONE LOCATED~~ TOTAL OF 2 EMERGENCY SPILLWAYS
INSP. REMARK		

FORM 487A ITEM	NOMENCLATURE	DATA
28	(SEE BELOW)	
29	D/S HAZARD	1
30	CREST LENGTH	~~01320~~ 1580+531 = 2111
31	SPILLWAY TYPE	U
32	SPILLWAY WIDTH	~~0250~~ 428+103 = 531
33	MAX DISCHARGE	~~0000260~~ 34,840
34	VOLUME	~~000279300~~
35	POWER INSALLED	234279
36	POWER PROPOSED	
37	NO. OF LOCKS	0
38-45	LOCK LEN/WID	
46	OWNER NAME	CONEWANGOCREEKWATERCOMM
47	ENGINEERING	
48	CONSTRUCTION	
49	REG. DESIGN	DEC
50	REG. CONST	DEC
51	REG. OPER.	DEC SCS
52	REG. MAINT.	DEC
53	INSPECTOR	
54	INSP. DATE	
55	INSP. AUTH.	EN CON LAW SECT 15-0507
56	(SEE BELOW)	
57	INSP. INIT.	03APR81
58	UNSAFE	
59	URGENCY	
60	INSP. COMPL.	15 MAY 81
61	RPT. APPR.	
62	GOV. NOTIF.	
63	INSPECTOR	DC
64	GOV. RPT.	
65	DEFICIENCY	6P

30 - EMERGENCY SPILLWAY; PRINCIPAL SPILLWAY IS A 42 INCH CONDUIT AND 10.5' x 3.5' RISER

33 - TOTAL OF BOTH EMERGENCY SPILLWAYS AND PRINCIPAL SPILLWAY.

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